

modern castings

SEPTEMBER, 1957

Owned by

THE MEN WHO BUY.....

CREATING ECONOMICAL CASTING DESIGN

Best designs will
blend ideas of all
who will work with
the part to be made

Cure for Swollen Castings

Effect of mold wall movement on a
gray iron casting can be predicted

Avoiding Sand Segregation

Add control of sand segregation
to your quality control program

Castings Showcase

Photo parade of unusual castings
from the Engineered Castings Show

AFS Institute Program

Training activities of AFS Institute
initiated with session in Detroit

Plans Start for '58 AFS Show

Equipment builders plan to unveil
revolutionary equipment in 1958

Stop Accidents

The castings industry's safety
record needs much improvement.
12-page Bonus Section presents
means for correcting conditions.



**FOUNDRY
RESEARCH**
includes

Lectromelt*

FURNACES
in planning
for the future



Electric arc furnaces give the exact control of heat and analyses needed to produce today's engineered castings. That's why research men, developing tomorrow's manufacturing methods, employ Lectromelt furnaces. They point the way to finer castings, faster production and lower costs.

Two Lectromelt furnaces are shown here in the laboratory where processes are worked out for a corporation's various foundries—small enough to expedite experiments, big enough to simulate production runs. With metallurgical research finding more and more uses for special alloy castings, foundries need such dependable Lectromelt equipment to meet their rigid requirements.

Catalog 9-B describes Lectromelt furnaces. For a copy, write to the Lectromelt Furnace Division, McGraw-Edison Company, 316 32nd Street, Pittsburgh 30, Pennsylvania.

*Reg. T. M. U. S. Pat. Off.

ITALY: Forni Stein, Genova... JAPAN: Daido Steel Co., Ltd., Nagoya... ENGLAND: Electric Furnace Co., Ltd., Weybridge... GERMANY: Demag-Elektrometallurgie, GmbH, Duisburg... SPAIN: General Electrica Espanola, Bilbao... FRANCE: Stein et Roubaix, Paris... BELGIUM: S. A. Stein & Roubaix, Bressoux-Liege.

future meetings and exhibits

SEPTEMBER

8-13 . . American Chemical Society, *Fall Meeting*, New York.

9-13 . . Instrument Society of America, *Annual Instrument Automation Conference and Exhibit*, Cleveland Auditorium, Cleveland.

17-20 . . American Die Casting Institute, *Annual Meeting*, Edgewater Beach Hotel, Chicago.

19 . . American Management Association, *Annual Meeting*, Sheraton-Astor Hotel, New York.

20 . . Malleable Founders' Society, *Fall Meeting*, Hotel Cleveland, Cleveland.

23-24 . . Steel Founders' Society of America, *Fall Meeting*, The Homestead, Hot Springs, Va.

23-25 . . American Society of Mechanical Engineers, *Fall Meeting*, Statler Hotel, Hartford, Conn.

23-26 . . Association of Iron & Steel Engineers, *Exposition*, Sheraton Hotel, Pittsburgh, Pa.

Sept. 25 . . Non-Ferrous Founders' Society, *Management & Operating Conference*, Coronado Hotel, St. Louis.

27-28 . . AFS Missouri Valley Regional Conference, Missouri School of Mines and Metallurgy, Rolla, Mo.

OCTOBER

2-3 . . AFS Michigan Regional Foundry Conference, Michigan State University, Kellogg Center, East Lansing, Mich.

3-4 . . Refractories Institute, *Fall Meeting*, Grand Hotel, Point Clear, Ala.

9-11 . . Gray Iron Founders' Society, *Annual Meeting*, Drake Hotel, Chicago.

12-13 . . Conveyor Equipment Manufacturers' Association, *Annual Meeting*, Grand Hotel, Point Clear, Ala.

17-18 . . Magnesium Association, *Annual Convention*, The Biltmore, New York.

17-19 . . Foundry Equipment Manufacturers' Association, *Annual Meeting*, The Greenbrier, White Sulphur Springs, W. Va.

18-19 . . AFS New England Regional Foundry Conference, Massachusetts Institute of Technology, Cambridge, Mass.

18-19 . . AFS Northwest Regional Foundry Conference, Hotel Vancouver,

Vancouver, B.C.

21-25 . . National Safety Council . .
45th National Safety Congress and Exposition. Conrad Hilton Hotel, Chicago.

22 . . American Society of Safety Engineers, *Annual Meeting.* Conrad Hilton Hotel, Chicago.

24-25 . . AFS Niagara Frontier Regional Foundry Conference. Statler Hotel, Buffalo, N. Y.

25-26 . . National Management Association, *Annual Meeting.* Penn-Sheraton Hotel, Pittsburgh, Pa.

31-Nov. 1 . . 10th Annual Purdue Metals Casting Conference. Purdue University, Lafayette, Ind.

NOVEMBER

2-10 . . International Congress & Exhibition of Measuring Instrumentation and Automation. Dusseldorf, Germany.

3-8 . . American Society for Metals and Society for Nondestructive Testing . .
2nd World Metallurgical Congress & 39th Annual National Metal Congress. Morrison Hotel, Chicago.

7-8 . . National Foundry Association, *Annual Meeting.* Waldorf-Astoria Hotel. New York.

11-13 . . Steel Founders' Society of America, *Twelfth Technical and Operating Conference.* Carter Hotel, Cleveland.

19-21 . . Investment Casting Institute, *Annual Fall Meeting.* Sheraton Hotel, Chicago.

DECEMBER

3-4 . . Foundry Facings Manufacturers Association, *Annual Meeting.* Hotel Waldorf-Astoria, New York.

4-6 . . American Institute of Mining, Metallurgical and Petroleum Engineers, *Electric Furnace Steel Conference.* Penn-Sheraton Hotel, Pittsburgh, Pa.

5-7 . . National Association of Manufacturers, *Annual Meeting.* Waldorf-Astoria Hotel, New York.

1958

JANUARY

30-31 . . College-Industry Conference. University of Michigan, Ann Arbor, Mich.

FEBRUARY

13-14 . . AFS Wisconsin Regional Foundry Conference. Hotel Schroeder, Milwaukee.

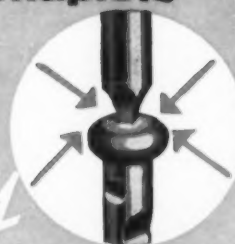
20-21 . . AFS Southeastern Regional Foundry Conference. Patten Hotel, Chattanooga, Tenn.

Only fine **FANNER**

shoulder radiator chaplets

have the exclusive

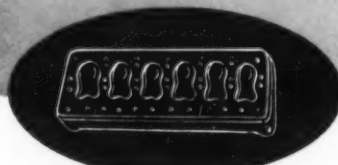
4 way



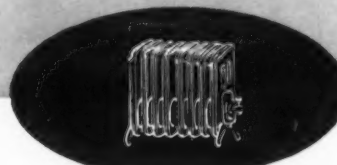
break-off nick

to improve production... save money

IDEALLY SUITED FOR



automotive castings



radiator castings



stove parts castings

EXCLUSIVE New
4-WAY BREAKOFF
NICK



Provides maximum support during pouring, yet stem breaks off easily in any direction so that the few remaining after shake-out can be easily brushed off with no apparent surface marks remaining.

STAGGERED
KNITTING NICKS



Provides better type of surface for knitting with molten metal, assuring thorough fusion and resulting in clean, solid castings.

STURDY SHOULDER
AND SOLID RIVETED
HEAD



Shoulder is designed and placed to permit chaplet to be set into pattern required distance without guesswork. Solid riveted head exactly at right angles to stem to insure that chaplet is always perfectly "true".

For better quality castings, for time and money savings in production use fine FANNER radiator chaplets. The exclusive four way break-off nick plus their other features speeds production of cleaner, sounder castings and reduces labor costs.

The development of the 4 way break-off nick is one more example of Fanner's constant study and engineering based on more than 60 years of experience in foundry practice.

Fine FANNER Radiator Chaplets are particularly suited for light pressure castings such as gas burners, radiator sections, manifolds and others. They are designed for use with the side of the greatest bearing surface against the green sand and will support approximately 5 pounds per square inch load.

Get complete information on FANNER Radiator Chaplets with the "4 way break-off nick" and other fine FANNER chaplets by writing for the FANNER Chaplet catalog today!

Qualified and specialized engineers in Fanner's Technical Service Division are available for consultation, without obligation, on problems of producing more intricate castings; developing increased strength, closer tolerances, and better quality; reducing machining and improving finish — both in ferrous and non-ferrous castings. Take advantage of the research and development work that Fanner has invested in this field to improve your profit picture! Simply direct your request to the address shown below.

THE FANNER MANUFACTURING CO.

Designers and Manufacturers of Fine Fanner Chaplets and Chills

BROOKSIDE PARK • CLEVELAND 9, OHIO

THE MODERN CONCEPT...

Full-size motor blocks are charged by crane and magnet through scale-mounted, weigh hopper to small-cone, orange-peel bucket.

in Cost Cutting!

Automization of the charging, melting and pouring cycle may follow set patterns. Still every installation is different:

Slag is granulated in water and flows to sludge tank.

Coke and stone from bins are weighed and recorded automatically.

Upper portion of charger indexes to serve more than one cupola.

Modern cupolas with continuous-tapping, front slagging spouts.

DIFFERENCES IN —

- lengths of melting time and types of iron may alter cupola designs . . .
- cupola locations and yard conditions call for differences in swiveling and indexing of the charger . . .
- charging cycles determining the stock bin and feeder equipment.
- automatic weighing and recording instruments — inventory the components, eliminate human error and insure uniformity of metal . . .

In all these and other ways MODERN's single responsibility for engineering, fabrication and erection is cutting the tonnage costs for the Bullard Company. Other case studies in catalog 147-C . . .

MODERN EQUIPMENT COMPANY, Dept. MC-9, Port Washington, Wisconsin

Mail to my attention:

- ☐ Catalog 147-C on charging and melting . . .
- ☐ Catalog 150 on cranes, and monorail systems . . .
- ☐ Catalog P-152-A on ladles and pouring . . .

Company.....

Street.....Box.....

City.....Zone.....State.....

My Name.....

Casting Replaces Forging in Outboard Crankshafts

■ Cast steel crankshafts for outboard motors are now being produced in a million dollar foundry at the Evinrude Motors plant in Milwaukee. Forgings were formerly used but castings have reduced the metal required, eliminated some machining operations, and have superior metallurgical properties.

In 1954 a pilot plant was set up with minimum melting, shell molding and related equipment. During the pilot run there was very little mechanization and no automation. Now operations at the foundry are completely automatic from the unloading of sand through shakeout and cleaning.

Shell molds are made on a 4-station shell molding machine with sand-resin handling equipment, four pattern frames with built-in individual heating elements carried by a turntable, a sand-resin investment station, and drives and controls for completely automatic operation.

Twelve shells 19½ x 29½ in., are made hourly. Cope and drag halves are made simultaneously and closed to form a 14¾ x 19½ in. mold.

At the ejector station the finished shell is stripped away from the pattern. The drag half is placed on a flat belt conveyor for setting of cores. From here it is transferred to the automatic shell closing machine while the cope half is transferred directly from the shell molding machine to the closing machine. Set face-to-face upon the drag the two halves are bonded together.

An air-operated mechanism holds the two halves together while the adhesive sets. Close tolerances between the cope and drag halves minimize fins on the finished casting.

An overhead trolley conveyor carries the molds past the pouring area. The pourer stands on a 24-in. wide moving pouring platform which is synchronized with the speed of the mold conveyor. Poured molds are carried by overhead conveyor to one of two pre-selected shakeout stations.

The foundry is operated by a staff of 20 men. Four are stationed at the shell molding and closing machines, one at the storage conveyor for loading molds onto trays on the overhead conveyor, five at melting and pouring, and one at the discharge end of the oscillating conveyor. Others are stationed at the muller, core machine, cleaning unit, cutoff machines, heat treating, and grinders.

september, 1957

vol. 32, no. 3

modern castings

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COVER PHOTO: Castings produced at Misco Precision Casting Co., Muskegon, Mich., must pass rigid inspection.

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FOUNDRY TECHNICAL CENTER, Golf & Wolf Roads, Des Plaines, Ill.
Vanderbilt 4-0181

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MODERN CASTINGS is indexed by Engineering Index, Inc., 29 West 39th St., New York 18, N. Y. and microfilmed by University Microfilms, 313 N. First St., Ann Arbor, Mich.

Published monthly by the American Foundrymen's Society, Inc., Golf & Wolf Roads, Des Plaines, Ill. Subscription price in the U.S., \$5.00 per year; elsewhere, \$7.50. Single Copies 50c. May and June issues \$1.00. Second-class mail privileges authorized at Pontiac, Illinois. Additional entry at Des Plaines, Ill.

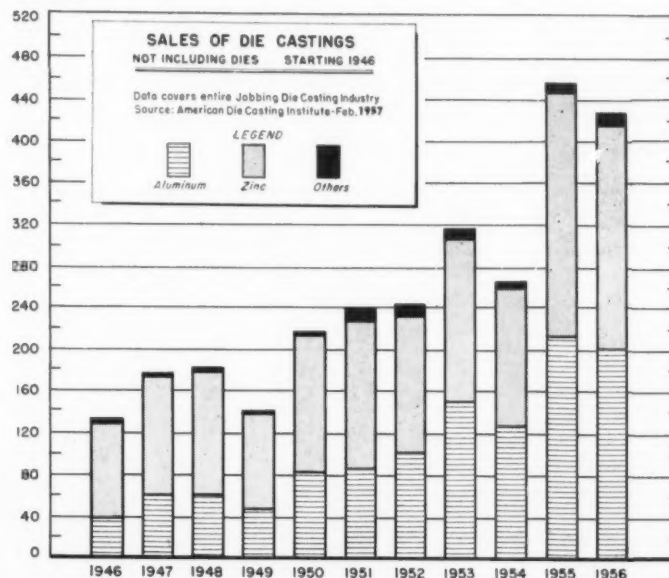


On The Management Side

■ **Federal Aid for Air Pollution Control.** Sensible programs for controlling air pollution can be established by intelligent cooperation between local community governments and their industrial neighbors. However, informed technical guidance is needed if a practical workable ordinance is to be established. A serious shortage of qualified engineers to render this assistance has become apparent. To alleviate this situation, the Federal government, through the Public Health Service, has made grants, totaling approximately \$90,000, to establish programs for both medical and engineering training in the field of air pollution. The funds will be used by state and local government agencies for training their personnel in this field of environmental health; for assisting educational and training institutions in development and support of new curricula; and for giving qualified individuals specialized training and instruction. The foundry industry should benefit from a more realistic attitude that is bound to develop from such an educational program.

■ **AFS Die Casting & Permanent Mold Division.** The ever increasing size and importance of die and permanent mold casting in the foundry industry has led the AFS Board of Directors to authorize the organization of a Die Casting & Permanent Mold Division to serve their needs. To demon-

MILLIONS OF DOLLARS

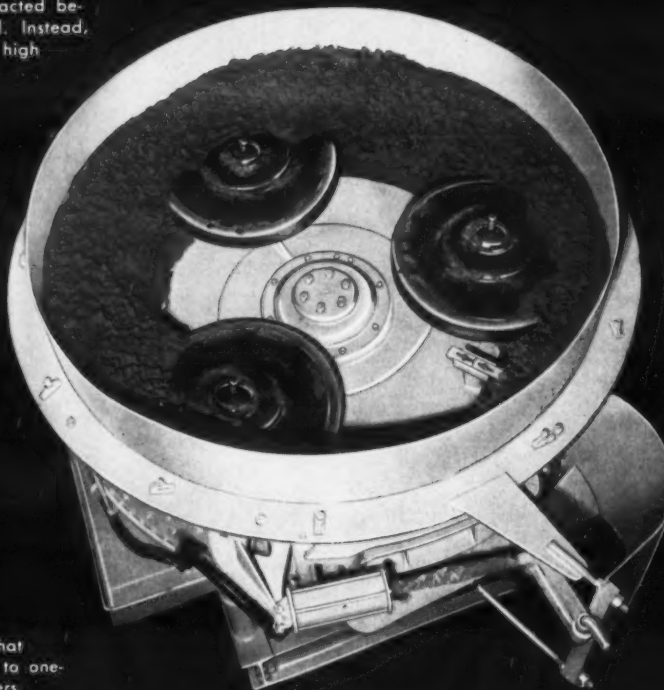


strate the size and growth of this industry the American Die Casting Institute has prepared the chart reproduced below. Aluminum die casters established a record high production of 367 million pounds in 1956. Another 30 million pounds of aluminum was used in zinc die casting alloys. This consumption by die casters represents 9.6% of the total annual aluminum supply.

Why buy a mullor that won't aerate?

only the **SPEEDMULLOR** aerates as it mulls!

- In the Speedmullor, the sand is not compacted between heavy steel wheels and steel bowl. Instead, sand is fluffed and aerated as it is mulled high on the side of the rubber lined bowl.
- Sand is mulled between rubber tired wheels and rubber lined bowl... no sand grain crushing... perfect squeezing and kneading mulling action. Another Speedmullor exclusive.
- Precise control of mulling pressure through scientifically applied centrifugal force — no dependence on hard-to-adjust springs where as little as 1/4-inch misadjustment will mean an 800 pound pressure error.
- Highest hourly capacity with far higher production per mullor dollar, yet smaller batches that can be handled by far less costly hoppers, conveyors, elevators, etc.
- Need cooling? Only the Speedmullor provides modern through-the-batch air cooling... doesn't merely blow air over the hot sand mass.
- Fast discharge required? The Speedmullor's centrifugal mulling and side discharge mean that discharge can be accomplished in one-third to one-fifth the time required by old style mixers.



HOURLY CAPACITY — FULLY MULLED AND AERATED SAND

Speedmullor Model	Hourly capacity of typical system sands not requiring cooling	Hourly capacity of typical core sands, facing sands, or hot system sands requiring cooling
Model 80A	76 tons per hour	38 tons per hour
Model 70A	58 tons per hour	29 tons per hour
Model 60A	38 tons per hour	19 tons per hour
Model 50A	29 tons per hour	14½ tons per hour
Model 40A	19 tons per hour	9½ tons per hour
Model 30A	13 tons per hour	6½ tons per hour

Write now for Bulletin No. 1220.

Beardsley & Piper Div. Pettibone Mulliken Corp.,
2424 N. Cicero Avenue, Chicago 39, Illinois.



S.F.S.A. Annual Meeting Scheduled for Sept. 23-24

■ Steel Founders' Society of America will hold its 55th Annual Fall Meeting at The Homestead, Hot Springs, Va., September 23-24. Howard F. Park, Jr., General Steel Castings Co., Granite City, Ill., society president, will preside at all sessions.

James M. Dawson, National City Bank of Cleveland; Joseph F. Leopold, Dallas, Texas; and Colin Carmichael, editor, *Machine Design*, Cleveland, will be featured speakers during the two-day meeting.

"The Way to Market Expansion," will be the theme of the September 23 session. President Park will review the activities of S.F.S.A. in the fields of market expansion and product development. Mr. Dawson will discuss forecasting business from the financial viewpoint.

Colin Carmichael, Chairman of the Judges Committee for the Steel Founders' Society of America 3rd product development contest, will preface the actual awards with a review of the winning entries and their portent to the future markets of steel castings. Cash awards of \$1,000, \$750, \$400, \$200 and \$100 with appropriate certificates will be presented in each of two classes of entries.

Managerial problems will be discussed at the Tuesday session with Mr. Leopold as the featured speaker on the subject of "Your Competitor—Uncle Sam". Chauncey Belknap, legal counsel for the society, will open the meeting. E. C. Huebner, Wehr Steel Co., Milwaukee, chairman of the society's safety committee, will speak on "Safety in the Industry."

Wetting Agents Cut Loss of Fines in Sand Conditioning

Wetting agents added to the water in revolving drum-type sand conditioning systems (used to reduce sand temperature and loss of moisture) will minimize loss of carbonaceous and bonding particles.

The penetrating properties of the agents gives better adherence of these particles to sand grains, according to Aquadyne Corp. This results in less pull-out of fines by the stream of air directed into the revolving drum as the sand is tumbled, aerated, dried, and cooled.

A similar effect in reduction of fines loss is achieved when a wetting agent is added to water used on mixing equipment which is set up for cooling sand. Faster wetting action is developed and less clay and other fine materials are carried out of the mixer by the air stream.

General Electric Conducts One-Day Castings Seminar

■ Foundry processes, guides to material selections, design information, criteria for selecting castings, and examples of cost reduction were presented to over 500 persons May 20 by the General Electric Foundry Department, Schenectady, N. Y.

Attending the castings seminar were laboratory personnel, manufacturing engineers and value analysts, as well as manufacturing, purchasing and production personnel from over 50



Hand molding at G.E. seminar.

General Electric departments and subsidiaries.

Steel, brass, aluminum, and malleable iron were evaluated in talks and demonstrations. Processes covered were permanent mold, sand, shell, precision, and vacuum casting. Design sessions included the effect of design on cost, casting tolerances, and how to obtain the maximum from design, pattern, alloys, and casting methods.



Better stop pouring Charlie . . . the janitor just called and said the cellar is flooded with hot brass.

DELTA DRI-BOND BINDER



DELTA

DEVELOPS

HIGHER TENSILE AND COMPRESSION STRENGTH . . .

GREATER WATER PROOFING PROPERTIES . . .

HIGHER GREEN STRENGTH AND HOT STRENGTH

IN
CORE
SAND
THAN
ANY
OTHER
DRY
BINDER
TESTED

DELTA DRI-BOND BINDER is a product of several years of research and experimentation in our own sand research laboratory and proved by additional years of actual experience-in-use data compiled by prominent foundries. The excellent results obtained with Delta Dri-Bond Binder, reported by all sources, establish beyond question both the outstanding superiority and greater economy of this new product for use in steel, gray iron and non-ferrous foundries.

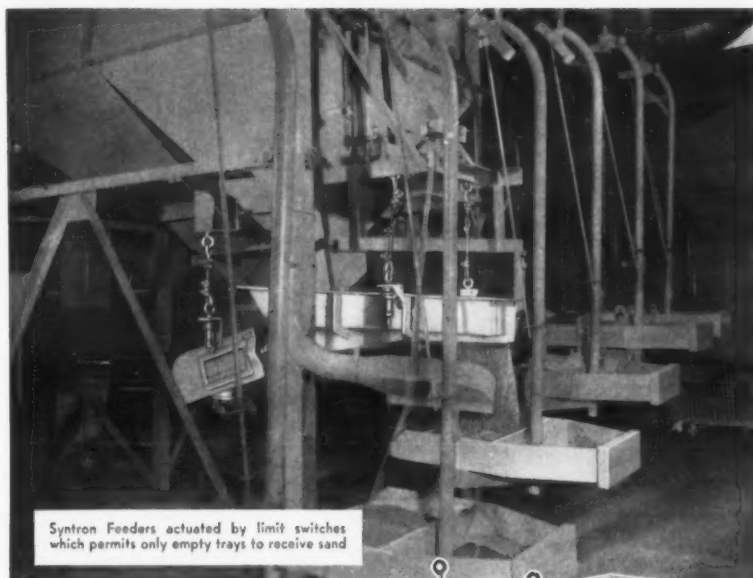
Cores made with Delta Dri-Bond Binder have excellent resistance to metal erosion, completely resist veining and metal penetration and shake out readily from the finished castings.

Get the Facts . . . Working samples and complete literature on Delta Dri-Bond Binder will be sent to you on request for test purposes in your own foundry.

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

**MILWAUKEE 9,
WISCONSIN**



Syntron Feeders actuated by limit switches which permits only empty trays to receive sand

SYNTRON

Vibra-Flow



VIBRATORY FEEDERS

provide a smooth, even flow of bulk materials at controlled rates.

Syntron Vibratory Feeders solve many materials handling problems for today's modern foundries.

Syntron Vibratory Feeders are powerful and compact, easily adapted to processing equipment. They handle almost every type bulk materials—fine powders or coarse, a few pounds or hundreds of tons per hour, wet or dry, hot or cold at flow rates to match capacities of operation.

Syntron Vibratory Feeders may be manually operated or automatically by limit switches that permit synchronization of feeder action with processing equipment.

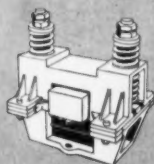
Syntron's electromagnetic drive provides economic operation with low cost and easy maintenance.

Investigate the possibilities of Syntron Vibratory Feeders. Send details of your problem to our application engineers for recommendations and quotations.

Builders of Quality Equipment for more than a Quarter-Century.

Other SYNTRON Equipment of proven Dependable Quality

BIN VIBRATORS



VIBRATING SCREENS



HOPPER LEVEL SWITCHES



Write for complete catalog data — FREE

SYNTRON COMPANY

545 Lexington Avenue

Homer City, Penna.

Circle No. 125, Page 7-8

products and processes

Mold and core machines have all moving parts enclosed and require no pits for installation. Capacities are based on 80 psi air line pressure at the machine. *Beardsley & Piper, Div. of Pettibone Mulliken Corp.*

For Manufacturer's Information
Circle No. 1, Page 7-8

Internal chill features one-piece construction. Allows faster heat transfer and more contact area for chilling and



fusing. Available in wide range of sizes. *Canton Chaplet & Chill Div., W. L. Jenkins Co.*

For Manufacturer's Information
Circle No. 2, Page 7-8

Tractor-shovel performs double duty in Michigan foundry. In addition to carrying new sand to hoppers beside



loading dock, it is also used in sand reclamation system. Unit is 16-cu ft model, fitting into boxcar. *Clark Equipment Co.*

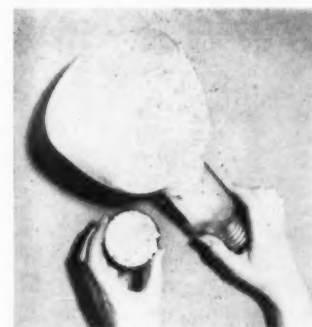
For Manufacturer's Information
Circle No. 3, Page 7-8

Air drill with positive feed has 4-in. stroke and feed rates of 4, 6, 8, and 10 thousandths per revolution for drilling and reaming aluminum alloys,

titanium, or heat-treated stainless and alloy steels. In failures, instant-return feature prevents further damage. *Gardner-Denver Co.*

For Manufacturer's Information
Circle No. 4, Page 7-8

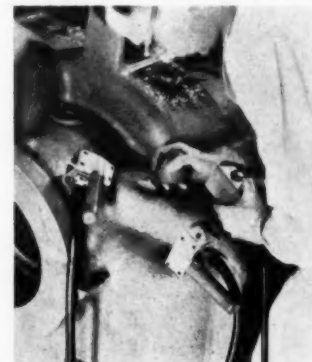
Mass spectrometer detector locates leaks in vacuum and pressure systems. Five methods of leak detection are available. Either hydrogen or he-



lium may be used as tracer gas. Spectrometer tube can be removed and replaced without shutting down vacuum system. *General Electric Co.*

For Manufacturer's Information
Circle No. 5, Page 7-8

Non-destructive testing utilizing permanent magnet makes magnetic particle inspection a one-man job. Mag-



netic source may be AC, DC or half-wave current. *Magnaflux Corp.*

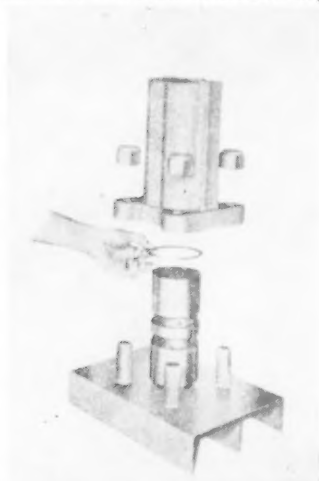
For Manufacturer's Information
Circle No. 6, Page 7-8

Epoxy resin repair kit for tools and castings contains aluminum colored

paste and catalyst in tubes. Equal bead lengths assure correct proportions. *Houghton Laboratories, Inc.*

For Manufacturer's Information
Circle No. 7, Page 7-8

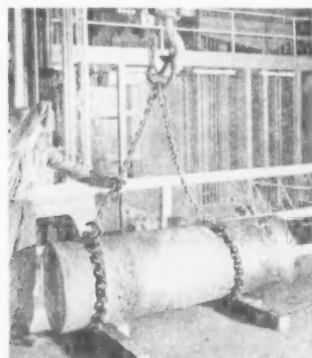
Vibrator, air-operated, has two part construction, excluding the optional base. Two-in. diameter model weighs



60 lb. 4-in. model, 79 lb. Assembly bolted to bin or to base plate welded on bin. Has permanent lubrication. *Cleveland Vibrator Co.*

For Manufacturer's Information
Circle No. 8, Page 7-8

Consumable electrode remelting furnace produces 26-in. diameter ingots weighing up to 12,000 lb. Used to produce super-alloys, zirconium, titanium as well as ferrous and non-



ferrous alloys. Metals are said to have high degree of purity and freedom from segregation. *Allegheny Ludlum Steel Corp.*

For Manufacturer's Information
Circle No. 9, Page 7-8

Core blowing and shooting machines handling cores up to 20 lb are available in diaphragm or draw types. Machines equipped with tank holding sufficient air for one blow. Blowing cannot start until sand magazine is sealed and core box is in blowing position. Stationary sand magazine

TECHNICAL TALKS ON MAGNETIC TAPE

■ In-plant training programs and individual foundrymen intent on increasing their knowledge may now benefit from the MODERN CASTINGS Technical Library of Tape Recordings. Forty-one complete presentations have been recorded and are available for rent at nominal cost. Listed on this card are the titles of 21 papers recorded at the 1957 AFS Castings Congress.

Please send the following tapes (list numbers) _____

Date desired _____ Check or purchase order enclosed.

Also send the complete list of 20 other tape recordings of foundry information now available. _____

Name _____ Company _____

City _____ Zone _____ State _____

Orders sent on these cards will receive first attention. Send card to
MODERN CASTINGS, Golf and Wolf Roads, Des Plaines, Ill.

Tape No.

- 19 "Welding Steel Casting with Carbon Dioxide as a Shielding Agent," J. J. Chyle, A. O. Smith Corp., \$3.50 — 45 Minutes.
- 20 "Effect of Carbon and Manganese on Properties of Constructional Steels for Dynamic Loading," R. D. Engquest, American Steel Foundries, \$3.25 — 38 Minutes.
- 21 "Hydrogen As It Affects Steel Castings," A. E. Gross, Ohio Steel Foundries, \$3.50 — 45 Minutes.
- 22 Malleable Shop Course—"Graphitization Theory and Mechanics, Effects of Chemistry and Melting Conditions on Overall Cycles," \$5.80 — 70 Minutes.
(over)

Please type or print

57/9

Please have information or bulletins indicated by circled numbers sent to me without obligation.

Name _____ Title _____

Company _____

Address _____

City										Zone										State									
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- 23 "A Review of Steel Foundry Literature from Behind the Iron Curtain," A. J. Kiesler, General Electric Research Laboratory. \$3.25 — 40 Minutes.
- 24 "Austenitic Manganese Steel Technology in Australia," Hadley Thomas, Industrial Steels, Ltd. Presented by H. E. Cragin, Jr., Taylor-Wharton Co., \$3.25 — 40 Minutes.
- 25 "Grain Refinement of Stainless Steel Castings," J. L. Walker and A. J. Kiesler, General Electric Research Laboratory. \$3.25 — 40 Minutes.
- 26 "Practical Studies of Vining Tendencies," George DiSylvestro, Burnside Steel Foundry Co. \$3.75 — 52 Minutes.
- 27 "Effect of Various Clays and of Tempering Methods on Sand Properties and Casting Quality," A. E. Murton, Dept. of Mines & Technical Surveys. \$3.75 — 52 Minutes.
- 28 "Mold Hardness: What It Means!" R. W. Heine, University of Wisconsin; E. H. King and J. S. Schumacher, The Hill & Griffith Co. \$3.50 — 45 Minutes.
- 29 "Influence of Sand Grain Distribution on Green Sand Casting Finish," C. E. McQuiston, Advance Foundry Co. \$5.55 — 70 Minutes.
- 30 "European Self-Curing Oil Binders," Dr. Franz Moser, Oel & Chemic Werk A. G., Hausen b/Brugg. \$3.50 — 45 Minutes.
- 31 "Some Generalized Solidification Studies," V. Paschakis and J. W. Hlinka, Columbia University. \$3.25 — 40 Minutes.
- 32 "Temperature Drop in Pouring Ladles," V. Paschakis and J. W. Hlinka, Columbia University. AFS Research Progress Report. \$6.30 — 90 Minutes.
- 33 Brass and Bronze—"Castings Design Clinic," Panel Members: F. L. Riddell, H. Kramer & Co., "Gating," G. F. Watson, American Brake Shoe Co., and R. A. Colton, American Smelting & Refining Co., Federated Metals Div., "Design of Castings," \$3.50 — 45 Minutes.
- 34 "Properties of Molding Sands Under Conditions of Gradient Heating," N. C. Howells, R. E. Morey, and H. F. Bishop, Naval Research Laboratory. \$4.00 — 55 Minutes.
- 35 "Influence of Various Bonding Materials on Stress-Strain Characteristics of Bonded Sands," F. C. Quigley and P. J. Ahern, Watertown Arsenal; J. F. Wallace, Case Institute of Technology. \$2.50 — 32 Minutes.
- 36 "Oil-Bonded Molding Sand," K. A. Miericke and R. C. Megaw, Baroid Div., National Lead Co. \$2.50 — 30 Minutes.
- 37 "Transport of Feed Metal During Solidification of Tapered Steel Bars," E. J. Sullivan, C. M. Adams, and H. F. Taylor, Massachusetts Institute of Technology. \$3.25 — 38 Minutes.
- 38 "Flow of Heat from Sand Castings by Conduction, Radiation and Convection," C. M. Adams and H. F. Taylor, Massachusetts Institute of Technology. \$5.80 — 68 Minutes.
- 39 "Effect of Temperature on the pH of Foundry Sands," N. D. Brinkmann, Process Development Section, General Motors Corp., and G. Gottschalk, Thiem Products, Inc., \$2.50 — 30 Minutes.
- 40 "Correlation Between Casting Surface and Hot Properties of Molding Sands," Report of AFS Committee 8-J (Physical Properties of Iron Foundry Molding Materials at Elevated Temperatures). J. A. Gitzen, Chairman, Delta Oil Products Co. \$3.50 — 45 Minutes.

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MODERN CASTINGS

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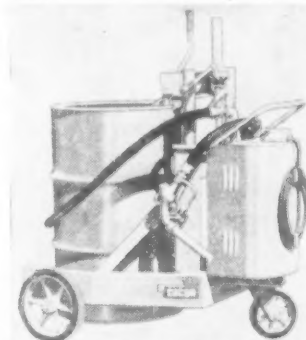
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used with filter sleeve which directs air flow during blowing and fluffs sand during exhaust. **Redford Iron & Equipment Co.**

For Manufacturer's Information
Circle No. 10, Page 7-8

Drum dispenser provides easy transportation to point of use and direct-from-drum electrical pumping. Drums to 1000 lb are lifted hydraulically.



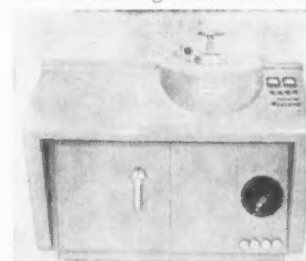
Open top drums of liquid may be carried without spillage. **Coolant Equipment Corp.**

For Manufacturer's Information
Circle No. 11, Page 7-8

Floor coating, applied by rolling, brushing, or spraying, improves traction. Coating is said to withstand temperatures of 2000 F and to be waterproof. Available in four colors. **Walton-March Co.**

For Manufacturer's Information
Circle No. 12, Page 7-8

High vacuum furnace, designed for continuous operation at 4000 F at a vacuum of 0.01 to 0.05 microns, features a tantalum heating element. Heater shell assembly which surrounds the heating element and work,



provides minimum impedance to the flow of gasses. Furnace chamber has 18-in. ID, 18-in. inside height. **Vacuum Furnace Div., Richard D. Brew & Co.**

For Manufacturer's Information
Circle No. 13, Page 7-8

Stainless steel alloy containing molybdenum has more than doubled life of cast screw pumps circulating solution of calcium and magnesium chlorides with solid NaCl in suspension. After nine years the parts show no corrosion. Previously copper and brass,

cast iron and another stainless type had been used. Alloy has nominal composition of 19 Cr, 9 Ni, 2.5 Mo, 0.07% max C. *Alloy Casting Institute.*

For Manufacturer's Information
Circle No. 14, Page 7-8

Wirebound box pallet bin used by metallurgical manufacturer holds 2240 lb, permitting shipment of mixed cars packed with variety of grades and sizes without mixing. Containers are loaded by fork lift trucks, 45 to 50



bins per car. Car cleaning has been eliminated. Bins weigh 75-90 lb, 3-1/2 per cent of gross shipping weight. *Wirebound Box Mfrs. Association.*

For Manufacturer's Information
Circle No. 15, Page 7-8

Silicon carbide crucible with large V-shaped pouring lip is said to minimize turbulence. Each lip is one-third to one-half overall height of crucible. *Electro Refractories & Abrasives Corp.*

For Manufacturer's Information
Circle No. 16, Page 7-8

Shell molds for stainless steel aircraft parts are said to have virtually eliminated machining in California foundry. Castings have uniform directional strength and resist distortion under



high heats. Type 347 stainless has ultimate strength of 75,000 psi minimum and minimum elongation of 35 per cent. Diameter of parts held to ± 0.015 of an in. *Bakelite Co.*

For Manufacturer's Information
Circle No. 17, Page 7-8

Hoist, air-powered, has 4000 lb capacity, and speed to 10 ft per min at full load. Length of lift is 8 ft. Hoist operates with one-hand control bar

Auto camshaft shows...

How hardenable Nickel Cast Irons Help sell more wear resistant castings

Automotive camshafts have been made of nickel cast iron for 25 years.

Today's autos have greater compression and higher lift valves. They subject camshafts to wearing conditions far more severe than ever before. Yet hardenable nickel cast iron still provides a sufficiently wear resistant material for camshaft to take this service. And so do a thousand other engineered castings.

Nickel Cast Irons provide better response to heat treatment for better wear resistance

Nickel Cast Irons have outstanding response to heat treatment—whether you flame or induction harden. In fact, nickel cast iron surfaces can be brought to higher Rockwell hardnesses (500 BHN minimum) more uniformly, for small cams or long machine tool ways. This assures superior wear resistance.

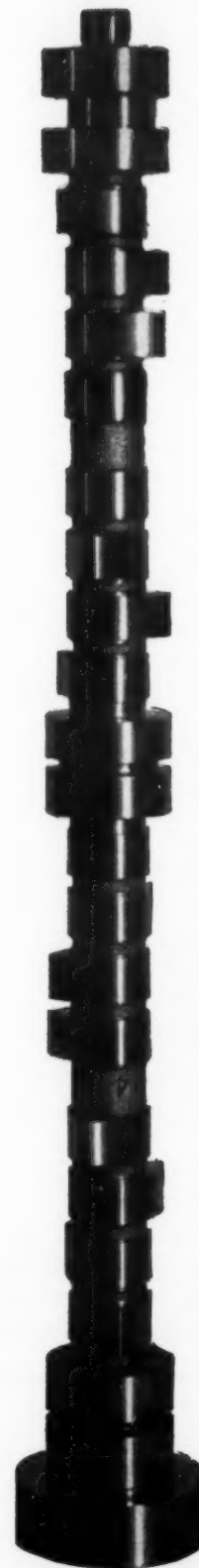
And nickel cast irons offer other benefits. Higher strength levels permit more efficient design, enable parts to carry higher loads. Outstanding machinability makes possible important savings in machining time and effort.

So when you have a job that requires superior wear resistance, for machine tool ways, for cams, for gears or for dies, think of nickel cast irons. Consider them in terms of your reputation for engineered castings—and consider the value of your customer's satisfaction.

There are many grades of nickel cast iron. Inco will be glad to help you formulate the right grade for your customers. Just write.

NICKEL CAST IRONS:

Best for you because they're best for your customers.



THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street
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Picture of Five Wheelbarrows

**What makes an HA
PAYLOADER®
best for your job?**

**Shortest turning radius
Higher dumping height
Biggest Bucket (18 cu. ft. payload)
Hydraulic load-shock-absorber
40° bucket tip-back at ground level
Exclusive one-lever bucket control**

THE FRANK G. HOUGH CO.

711 Sunnyside Ave., Libertyville, Ill.

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☐ Models HA (18 cu. ft.) and HAH (1 cu. yd.)

☐ Larger models to 2 1/4 cu. yd.

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56F

Of course you don't see 5 wheelbarrows, but you do see one man on a model HA "PAYLOADER" at the foundry of Domestic Pump & Mfg. Co., Shippensburg, Pa., and the management says it does as much work as 5 men with wheelbarrows handling sand, castings and scrap. Foundries and metal-working plants everywhere like this "PAYLOADER" because it can travel and work where others can't—negotiate narrow aisles, boxcar doors and corners. Yet it boasts a bigger bucket (18 cu. ft. payload) and can dig more, carry more and deliver more tonnage than any tractor-shovel anywhere near its size.

It will pay you to find out what this new style model HA or a larger "PAYLOADER" can do for you. Your nearby Distributor is willing to demonstrate and also tell you about the extra useful attachments—sweeper, fork lift, tine bucket, snow plow, etc. See him today.



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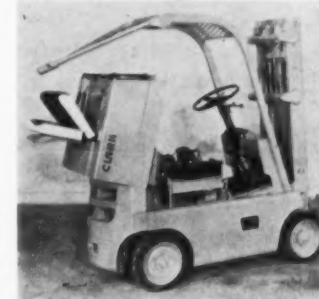
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SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY



or remote pendant control. *Gardner-Denver Co.*

For Manufacturer's Information
Circle No. 18, Page 7-8

Fork lift truck overhead guard has spring-loaded rear strut which swings out of way for quick access to engine. Protective screen does not restrict visibility. Guard is narrower than



truck to permit working in confined areas. Available in two models to fit gasoline and LPG models in 2000-5000 lb range. *Clark Equipment Co.*

For Manufacturer's Information
Circle No. 19, Page 7-8

Swing-loader turns 180°, handles flasks and other materials in foundry yard. Lifts to 5000 lb. Powered by



gas or diesel engines, unit may be equipped with buckets, lift forks, back filler blade, back hoe, and tote hook. *Pettibone Mulliken Corp.*

For Manufacturer's Information
Circle No. 20, Page 7-8

Compressed air line cleaner is said to remove 92% of oil, moisture, and dirt. Unit employs centrifugal force, baffles vanes, for cleaning. Contamination and moisture drip by gravity into a trap. Fits airlines 3/4 to 10 in. d. *Logan Engineering Co.*

For Manufacturer's Information
Circle No. 21, Page 7-8

Overload control for electric motors with contact meter-relay action has continual indication of motor load and adjustable load limits. Dial ranges from 0 to 150 per cent of normal load. When pointers meet in overload

Circle No. 126, Page 7-8

position, contacts lock and circuit is broken. *Assembly Products.*

For Manufacturer's Information
Circle No. 22, Page 7-8

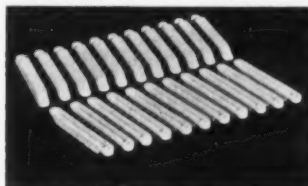
Refractory gun with nozzle control of material, air, and water flow is operated by one man. Available in



four sizes, capacities range from 1700-5600 lb and handle granular cement-like materials from 30 to 160 lb bulk density. *Ridley & Co.*

For Manufacturer's Information
Circle No. 23, Page 7-8

Combustion boat, carbon-sulfur, has high thermal shock resistance and low penetration. Measures 1/2 x 3-



3/4 in., 7/16 in. deep. *Harry W. Dietert Co.*

For Manufacturer's Information
Circle No. 24, Page 7-8

Blast cleaning machine with 4000 lb capacity, handles castings 24 x 48 in. Single door exposes half of 48-in. diameter working table. Single 10-hp overhead wheel throws 15,000 lb of



abrasives hourly, may be increased with optional equipment. Self-contained automatic elevator and separator continuously supply abrasive for recirculation. *Pangborn Corp.*

For Manufacturer's Information
Circle No. 25, Page 7-8

Industrial glove, 14 1/2-in. fully coated gauntlet style, uses outer vinyl coating to protect against oils, caus-

1. COOLING

After the pour, castings, molds and backing sand are automatically discharged from trolley conveyor into this 36-in. wide Torqmount conveyor—first in system of Link-Belt oscillating conveyors. Material travels at 10 fpm to facilitate cooling.



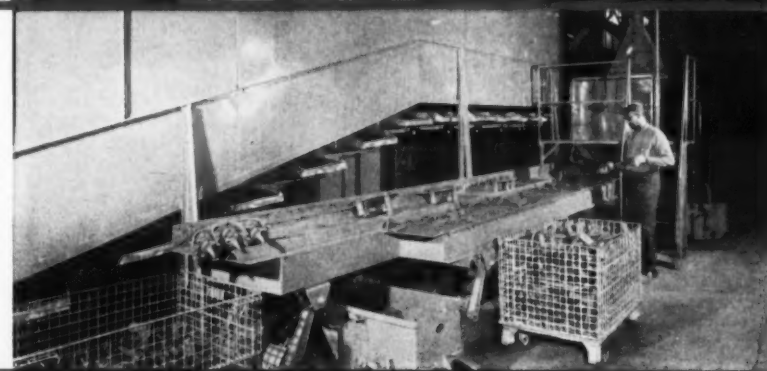
2. SCREENING

This 8-ft. screening section, with 3/8-in. diameter openings, efficiently screens off backing sand and finer particles of mold sand. Lower trough of the conveyor carries the sand to bucket elevator discharging to belt conveyor delivering to storage bin.



3. SORTING

Last 21 ft. of oscillating conveyor system serves as a sorting table. A divider channels the material to one side where it can be easily sorted by one man. Castings and sprues are collected in wire baskets for further cooling, and refuse sand drops into a tote box.



LINK-BELT Torqmount oscillating conveyors unite all 3 in one continuous sequence

From shakeout to sorting—Link-Belt Torqmount oscillating conveyors provide gentle, continuous handling at this highly mechanized shell mold foundry. Combining *positive action* and *natural frequency*, they move hot castings from the shakeout smoothly through cooling, screening and sorting . . . hold manual labor to a minimum . . . assure safe, clean working conditions.

Link-Belt can add new economy and efficiency to your castings production. Whether you need one machine or complete engineering, call your nearest

Link-Belt office. **NOW**—36-in. wide oscillating conveyors are available from **STOCK**. Get Book 2423 for full facts on Link-Belt's broad line of foundry equipment.

14. 001

LINK-BELT

OSCILLATING CONVEYORS



LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World.

Circle No. 127, Page 7-8

September 1957 • 11

tics, and acids. Utilizes single seam lining and seam-free surface. *Pioneer Rubber Co.*

For Manufacturer's Information
Circle No. 26, Page 7-8

Sand conditioning unit mixes continuously on conveyor belt, 3 to 300 tons hourly. Features separate sections for mulling, mixing and aerating. If one section breaks down, remaining units continue to supply sand. Two-stage unit used for brass and aluminum foundries, 3-stage for malleable, gray iron and 4-stage for steel foundries. *Pekay Machine & Engineering Co.*

For Manufacturer's Information
Circle No. 27, Page 7-8

Core and mold drying ovens of newest design use combination "up-draft" and "down-draft" recirculating heating systems. Design is said to allow greatly increased flexibility in directing oven gasses around the work, assuring more uniform drying. First installations now being made in two East Coast steel foundries and literature is available. *Carl Mayer Corp.*

For Manufacturer's Information
Circle No. 28, Page 7-8

Most Crane Accidents Occur While Loading

Accidents while working near the load of crawler, truck and locomotive cranes account for 41 per cent of all crane injuries, according to a survey by the National Safety Council.

Unsafe practices and working too near obstructions and stationary equipment are responsible for 12 per cent of total accidents. Violations of safe practices in fueling, checking water, and other maintenance work contribute to 11 per cent of accidents.

Other crane accidents result from failure of defective booms, cables and sheaves, working or standing in line of the swing of a crane cab or boom, and jumping off or climbing on cranes without using handholds.

One of the chief crane operating hazards is electricity, the National Safety Council reports. If booms or hoist lines contact power lines, a death-dealing shock may result. Consult power company for safety recommendations before operating a crane near power lines.

Observation of three basic steps will aid in reducing accidents.

- Require regular and thorough inspections of hooks, slings, cables, booms and other vital parts and keep them in safe condition.

- Train operators, hitchers, riggers, and other workers in safe practices.

- Require all personnel to observe safe practices.

Circle No. 128, Page 7-8



Archer Daniels Midland

FOUNDRIY PRODUCTS DIVISION • 2191 West 110th Street

company

Cleveland 2, Ohio

There's an ARCHER QUALITY foundry product in your future

... if you're in the foundry business. That's because ADM makes a binder for every type core, for every core making system and for every type sand.

One source helps you get what you want when you want it, whether it's a standard oil-sand binder (one of the famous LINOILS for instance) or whether you're gassing cores and need an efficient special binder for CO₂ cores.

There's seldom a delay since ADM can ship from any one of a huge network of plants and warehouses across the country.

Equally diversified is the army of ADM representatives; each man is technically qualified to make practical suggestions on various processes and corresponding binders. They have no axe to grind for any single type of binder, because ADM supplies them all.

These are the reasons why it doesn't take a swami to predict that there's an Archer Quality Foundry Product somewhere in your future.

Write today for file folder of information on these quality foundry products.

Augmenting the Archer Quality Line...

These additional foundry products are available through ADM's new subsidiary, The FEDERAL FOUNDRY SUPPLY Company:

SAN-BLO CORE BLOWER
WHIRLMIX SAND MIXERS
FEDERAL GREEN BOND BENTONITE
FEDERAL SAND STABILIZER
CROWN HILL SEA COAL
... and a COMPLETE LINE
of FOUNDRY FACINGS

Physics of Noise Chapter in Manual Defines Terms

Sound is generated by vibration of any surface in contact with air. Compression and expansion of the air (variations in atmospheric pressure) cause sound.

Generation of Sound

The number of variations in pressure generated per second is defined as the "frequency of sound." One compression and one expansion constitute a complete cycle.

Frequency of Sound

Although the terms "frequency" and "pitch" are used interchangeably, frequency defines a quantity of sound, while pitch defines a quality of sound.

The Bar

The atmosphere surrounding the earth has weight and therefore presses on the earth with a force equal to the weight of the column of air above a given area. This force varies with different atmospheric conditions. Many units are given for this weight. The most common unit is expressed as inches of mercury. Various other units are also used. Physicists and engineers call these expressions of normal pressure "one atmosphere" or approximately "one bar."

Since changes in atmospheric pressure due to weather variations are small, the bar has been divided by 1000 so that 1000 milibars equal approximately one atmosphere. In acoustics, the pressure changes are even smaller than those encountered in weather changes. For this reason, the bar has been divided into a million parts or "microbars."

The Decibel

The decibel is a term associated with noise measurement. It represents a relative quality, and when used to express noise level, a reference level is implied.

The Sone

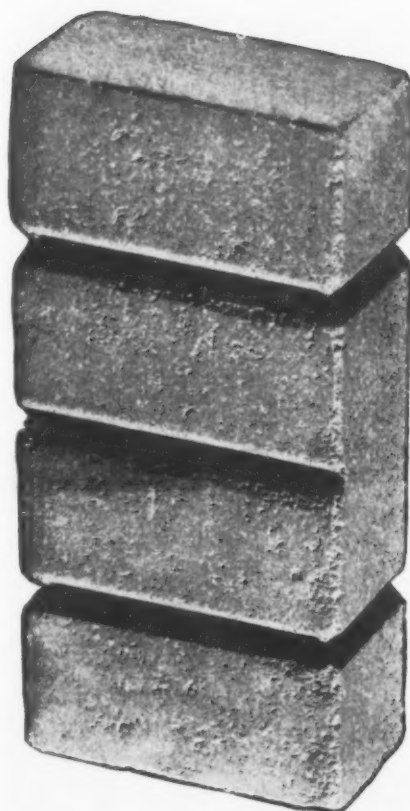
Although some sounds are louder than others, loudness of sound is not rated on a numerical basis. Experimenters have asked observers to make judgments on the loudness ratio of sounds. The resultant judgments depend to a considerable extent on the technique of the experimenter. But on the basis of such judgments, a numerical scale of loudness has been devised which rates sounds from soft to loud in units of "sones." The loudness unit, the sone, may be referred to as a sensation unit.

This article is based on the "Physics of Noise" chapter in the American Foundrymen's Society FOUNDRY NOISE MANUAL, to be released at a future date.

Circle No. 128, Page 7-8

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... Famous
CORNELL
CUPOLA FLUX

Its special chemical and physical properties assure you of cleaner iron. All we ask you to do is to give it a try. Then judge for yourself!



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Manufacturers of Iron, Semi-Steel, Malleable, Brass,
Bronze, Aluminum and Ladle Fluxes—Since 1918

Circle No. 129, Page 7-8

14 • modern castings

let's get personal

S. M. Norwood . . has been appointed assistant to the president of Electro Metallurgical Co. He will continue as a vice-president of this Union Carbide Corp. division in addition to his new duties.

National Bearing Div. of American Brake Shoe Co. has appointed **A. L. Hunt** and **P. J. Bauman** as vice-presidents. Mr. Hunt was formerly general manager of the division's St. Louis plant and Mr. Bauman was formerly general manager of National Bearing's plant in Meadville, Pa.

C. A. Sanders . . 1957 winner of the AFS John H. Whiting Gold Medal, will deliver a paper before the Netherlands' Association of Foundrymen on September 24.

John B. Girdler . . has been appointed to the new post of commercial vice-president of sales for Vanadium Corp. of America, New York.

Federal Foundry Supply Co., Cleveland, now operated as a subsidiary of Archer-Daniels-Midland Co., Minneapolis, has named new officers and directors. **T. L. Daniels**, ADM president, has been elected chairman of the board. **Warner B. Bishop, Jr.**, vice-president and general manager of ADM's Foundry Products Div., has been elected president, succeeding **Elmer Ditty**, who has retired. Direc-

tors in addition to Daniels and Bishop are **Louis Heyl**, Cleveland, who continues as Federal Foundry executive vice-president; **S. S. Adair**, ADM treasurer; **G. K. Nelson**, ADM director of development; and **Peter Reed**, Cleveland attorney.

J. E. Brinkerhoff . . vice-president, Babcock & Wilcox Co., has been elected president of the Refractories Institute.

Wheelabrator Corp. announced a series of executive appointments. **J. F. Connaughton** has been elected to the new post of executive vice-president; **H. M. Miller**, formerly vice-president, has been named senior vice-president; **J. A. Schmidt, Jr.**, formerly treasurer is now secretary-treasurer; **J. M. Wolf**, formerly assistant treasurer is now controller; and **E. T. Sullivan** has been appointed assistant secretary-treasurer.

F. A. Depweg . . has been appointed manager of the newly created special products sales department at Hamilton Div., Baldwin - Lima - Hamilton Corp.

J. K. Loudon . . has been named vice-president, director, and chief executive officer of Lebanon Steel Foundry, Lebanon, Pa. He was formerly vice-president and director of the York Div., Borg-Warner Corp.



W. B. Bishop, Jr.



J. F. Connaughton



J. K. Loudon

Mr. Loudon holds the Gilbreth Medal of the Society for the Advancement of Management and the W. R. Warner Medal of the American Society of Mechanical Engineers.

F. M. Pritchett . . has been appointed sales representative for Oak Hill Foundry & Machine Works, Inc., Oak Hill, Ohio. He will also be in charge of the plant's technical control functions.

Sheffield Foundry Co., Chicago, has named **John F. Wooddell** as plant superintendent and **Richard E. Marks** as sales manager.

A. F. Sprankle . . has been named technical director and assistant vice-president of Vanadium Corp. of America and will be located at the firm's research center at Cambridge, Ohio. Mr. Sprankle received the American Iron and Steel Institute's Annual Regional Award in 1956.

D. F. Sawtelle . . has joined Exomet, Inc., as a sales engineer. Formerly chief metallurgist for the iron and steel foundries of Malleable Iron Fittings Co., he will now be headquartered in Chicago.

I. K. MacGregor . . has joined Climax Molybdenum Co., New York, as vice-president in charge of Eastern operations. He was formerly associated with Manning, Maxwell and Moore, Inc. Electro-Alloys Div., American Brake Shoe Co., has announced the appointments of **C. E. Christie** and **W. D. Raddatz** as vice-presidents.

C. E. Claus . . is now plant manager of the Grand Rapids plant of Doehler-Jarvis Div., National Lead Co.

E. A. Short . . executive of Mid-Continent Steel Castings Corp., Shreveport, La., has been named Chief, Casting Branch, Iron and Steel Div., Business and Defense Services Administration. He succeeds **S. G. Falk**, who has completed a six-month term in the post.

R. L. Folkman . . has been named sales engineer for titanium by Electro Metallurgical Co., Div. of Union Carbide Corp. Mr. Folkman has been associated with the development of titanium at the firm's Niagara Falls, N.Y., laboratories since 1951.

Electric Auto-Lite Co. has appointed an operating manager and a sales manager for its foundry division. **R. W. Munger**, formerly manager of the firm's Mt. Vernon, Ill. foundry, has been named operating manager. **R.**

continued on page 67



Knight services include:

Foundry Engineering

Management

Organization

Industrial Engineering

Wage Incentives

Cost Control

Production Control

Modernization

Mechanization

Materials Handling

Automation

Survey of Facilities

Architectural Engineering

Construction Management



**The sound way to
REALIZE ANTICIPATED PROFITS
is to AUDIT your operations**

In foundry operation, making the best use of facilities and manpower determines the balance between profit and loss.

In many foundries, management and operation audits by experienced Knight engineers have helped to swing the balance to profit—through low-cost, readily effected improvements.

A recent Knight audit for a Michigan foundry resulted in substantial production increases and reduced costs. Improvements included the installation of a conveyor which eliminated handling . . . a rearrangement which increased capacity without additional floor space . . . and automatic timing devices which brought accurate process control and increased production.

These simple low-cost changes, accomplished without interruption to production, are part of a coordinated plan which is designed for future expansion requirements.

If you are interested in an audit of your operations to establish a program of improvement, take advantage of Knight experience and call or write our Chicago or New York office for prompt attention, without obligation.

Write for Bulletin 101 Professional Foundry Engineering.

Lester B. Knight & Associates, Inc.

Management, Industrial and Architectural Engineers
MEMBER OF THE ASSOCIATION OF CONSULTING MANAGEMENT ENGINEERS, INC.

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BORON DEOXIDIZERS
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**FERRO-MOLYBDENUM
MOLYBDENUM OXIDE
RARE EARTHS**

**FERRO-TUNGSTEN
MOLYBDENUM AND
TUNGSTEN METAL POWDERS**

CHEMICALS OF MOLYBDENUM...TUNGSTEN...BORON

Molybdenum is now available in unrestricted supply to improve strength and machinability. Dependable results are still one of its major attributes.

Tungsten, for hardenability and wearability improvement is now used in surprisingly small additions, with great success.

Boron, as an intensifier of the effects of other alloying materials, may be used in very minute additions, and yet maintain the essential properties of the castings desired. The most economical

and satisfactory form to introduce Boron is recognized to be found in MCA's Ferro-Boron.

Operating the world's largest rare earth deposits, the Molybdenum Corporation of America has recently conducted extensive pioneering research in evaluating the properties, applications and uses of RareMeT Compound.

In nodular iron, small additions of rare earths have helped to produce consistently good ductility by counteracting subversive elements such as lead and titanium.

Write today for further information.

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Subsidiary: Cleveland Tungsten, Inc., Cleveland

Plants: Washington, Pa., York, Pa.



An Open Letter To Foundry Management

**Laxness of foundrymen has
led to passage of new codes**

■ The castings industry, together with other industries, is not paying proper attention to the continuing efforts of city and state regulatory authorities to impose codes controlling working conditions, air pollution, and other alleged nuisance problems.

Your American Foundrymen's Society is in a position to help when the following problems confront you:

■ What to do if regulatory authorities apply a smoke law such as the A.S.M.E. Smoke Regulations to the effluent of your metallurgical furnaces and exhaust stacks. This has already happened in some areas.

■ What to do if you have a jolt molding machine operating within 500 ft of your neighbors' property line that causes vibration to be felt on their property.

■ What to do if noisy operations that can be heard beyond your property line cause complaints.

■ What to do about odors for core oven stacks and other operations that are evident on the public highways.

■ What to do if an unreasonable loss-of-hearing regulatory code becomes effective. This has already happened in some states.

Guides Are Available

The AFS Safety, Hygiene, and Air Pollution Program Steering Committee, together with the AFS director of the program, have been working on these matters to develop information that can be helpful to you in understanding these problems. Information has also been developed that can be used as a guide for regulatory bodies in promulgating reasonable rules and regulations that will not work unreasonable hardship on any industry or employer.

Keep Informed

Your part in this program is to establish competent listening posts so you will know when your city, county or state is beginning to consider rules affecting your operations. Steps should be taken to set up these listening posts through your local Chamber of Commerce and/or your State Manufacturers Association.

The reason is obvious: if the regulatory authorities draft rules and regulations without your knowledge,

even in a preliminary form, there is the pride of authorship and a feeling that their sources of information are unimpeachable, and it becomes a difficult job to effect any changes later on.

Recommendations

Our recommendation for the most logical approach when regulatory rules and regulations are contemplated is for your local AFS chapter to join with other local groups and with technical guidance from our Director, sit down with the authorities and work out reasonable regulations.

We can assure you that this method has been tried many times and works to the benefit of industry.

Legislation Increasing

We are alarmed at the large number of areas that have already developed codes which are now under consideration or which have already been placed in effect before help was requested from AFS. In many cases the requirements are somewhat impractical and unreasonable. Probably very little relief can be had now because of the factors I have mentioned previously. It is just too late.

Your Safety, Hygiene and Air Pollution group has the best informed men in the industry on the various subcommittees. Material that is being published is invaluable to you. Furthermore, you are at liberty to draw on the experience of the group. If any special problem arises, group help can be obtained through the Director.

Our efforts over the past 25 years to make the foundry a better place to work have been of great value to the industry. A whole new group of problems now confront us, and many are very complex. We can help if you avail yourself of the opportunity to use the material we have developed, in the manner suggested in this letter.

JAMES R. ALLAN / Chairman
Steering Committee
Safety, Hygiene, and Air Pollution
Control Program
American Foundrymen's Society

Magnesium Group to Meet

"Magnesium In Perspective" has been announced as the theme of the 13th annual convention of the Magnesium Association, to be held at the Biltmore, New York, October 17-18.

Papers to be presented will concentrate on a survey and review of the major present areas of use for magnesium plus a projection of new uses and applications.



6 ways

to assure good surfaces on shell-molded castings

Smooth castings that require a minimum of finishing are a major advantage of shell molding. Don't lose it through surface roughness that may cause otherwise sound castings to be rejected. Here are six ways to assure good surfaces on shell-molded castings:

1. *Pour at the correct temperature.* Usually, the lowest permissible pouring temperature results in the smoothest surface.
2. *Check for poorly filled shells.* Low density shells often cause roughness.
3. *Avoid nozzle ingates.* Increase ingate areas or choke the runner system.
4. *Avoid metal inclusions.* Keep runners full at all times, especially with drossing and high temperature alloys.

5. *Position horizontally.* This reduces metallostatic head, thus decreases tendency of metal to penetrate shell.

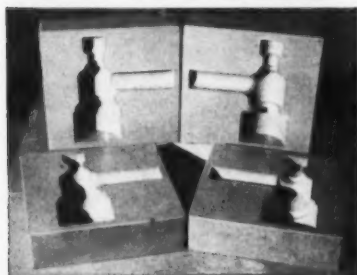
6. *Check sintering point and grain size distribution of sand.*

One thing more. Use a top-quality resin. G-E resins are preferred by many foundries for their good flow properties, fast cure, fine particle size and excellent release properties. Try them. And write today for a helpful brochure, "59 Answers to Your Shell Molding Problems". GENERAL ELECTRIC COMPANY, Section MC-5. Chemical Materials Department, Pittsfield, Mass.

Progress Is Our Most Important Product

GENERAL  ELECTRIC

**16 HOURS
VS.
65 HOURS**



PLASTIC STEEL A DEVCON PRODUCT
80% STEEL — 20% PLASTIC

**CUTS 49 HOURS . . .
MAKING THESE
CORE BOXES**

PLASTIC STEEL . . . originally developed for making tools, jigs and fixtures in metalworking plants . . . brought a revolutionary new method to this leading foundry* . . . chopping hours off the time required to produce core boxes, molds, duplicates of wood and metal patterns. Tremendous savings are being shown daily . . . making low cost patterns, repairing and altering patterns, filling large or small blow holes in ferrous and non-ferrous castings, repairing and rebuilding machinery, and making blow boxes and shell molds or driers.

PLASTIC STEEL becomes a strong, tough, metallic mass (similar to steel) within 2 hours after addition of the special hardening agent. Once hard, PLASTIC STEEL can be drilled, tapped or sawed with metalworking tools. PLASTIC STEEL is non-shrinking, non-expanding . . . adheres to ferrous and non-ferrous metals, wood, glass and many other surfaces.

*NAME ON REQUEST

SAVE UP TO 75% IN TIME . . .

25% to 75% OF TOTAL COSTS

. . . OVER CONVENTIONAL

METHODS OF PATTERN

MAKING WITH PLASTIC STEEL

Prove these figures to yourself . . . read complete, documented facts in DEVCON'S Foundry Bulletin — write for your copy today.

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DEVCON CORPORATION

127 Endicott Street, Danvers, Mass.
Circle No. 133, Page 7-8

18 • modern castings



the editor's field report

by

Jack Schram

♦ **TAPE RECORDINGS—A NEW MEDIUM FOR LEARNING:** Tired reading? Miss the AFS Castings Congress in Cincinnati? Well just make yourself comfortable, turn on your tape recorder, close your eyes, and listen to A. J. Kiesler, General Electric Co. metallurgist, tell all about "Steel Foundry Practices Behind the Iron Curtain." Or if this subject does not strike your fancy select another of the 20 technical talks that were recorded on tape during the Congress. The complete list showing subjects and speakers appears on page 7 of this issue.

■ An added bonus is the recording of the oral discussions that follow presentation of these talks. Much valuable information is often brought out during this informal part of the sessions. Besides these, MODERN CASTINGS has in its Tape Recording Library six excellent talks given at the California Regional Foundry Conference in March 1957, six educational courses sponsored by the Chicago AFS Chapter, and six technical talks given before this Chapter during the past year. A complete list showing titles and authors may be had by forwarding the order card on page 7.

■ AFS Chapters may find it expedient to keep an appropriate recorded talk on hand to supplement a particular program or to provide for that embarrassing situation when the guest speaker has his plane grounded by bad weather and arrives two days late.

■ In-plant training programs are another useful spot to utilize this versatile medium for furthering education of foundrymen. Several AFS Chapters have found this technique valuable in recording round table or panel discussions. Central Michigan recorded their 1957 Educational Short Course "Modern Molding Methods—Shell Molding—CO₂—Green Sand" and presented it to MODERN CASTINGS for possible publication as a Bonus Section. Central Indiana Chapter taped one of their top speakers last year so that members unable to be on hand could still hear the talk.

■ One of the most enthusiastic advocates for the use of tape recording is AFS member George Di Sylvestro, Burnside Steel Foundry Co., Chicago. During the AFS Engineered Castings Show, he took color photographs of many interesting exhibits and then had the company official in charge of the display describe the

castings. The descriptions were recorded on tape and have been coordinated into an excellent audio-visual tour of the 1st Engineered Castings Show. The boys back home who didn't have a chance to go to Cincinnati will enjoy seeing and hearing about these highlights of the Show.

■ It has been estimated that there are over a million and a half tape recorders in use in this country. If you don't own one personally your company probably does or will find it worthwhile to buy one. Incidentally they make good dictation machines that can be used for communication instead of letter writing, and will provide background music during that coffee-break. Let me know if you have found any other helpful applications for them in the casting industry.

♦ **PUTTING THE PRECISION INTO CASTINGS:** That perfect looking precision investment casting you see in a jet engine assembly has passed through a remarkable transmutation since it was shaken out of its refractory mold in the foundry. The 50 micro-inch surface finish and the plus or minus 0.004 in./in. dimensional accuracy displayed by the finished casting began with a pedigreed ugly duckling having a rather ordinary appearance.

■ As you walk through the plant you will immediately become aware of the large number of employees busily engaged in cutting, grinding, filing, sanding, and blasting the casting surfaces toward perfection. As many as 25 per cent of the plant personnel may be working in this phase of production. When all surface imperfections are removed x-rays prove the internal quality of the castings.

■ Dimensional accuracy must then be guaranteed by checking with jigs and fixtures worth thousands of dollars. Highly skilled artisans can alter a length, curvature, or angle by a gnats eyebrow with a skillful blow of a dollar hammer. Many valuable pieces are salvaged from final rejection by this relatively crude technique. So many of the production operations require a delicate touch that you will find about three-fourths of the employees are women. If you envy the \$16 a pound received for these castings just visit an investment casting plant and see their skeen-teen headaches that a green sand foundry never knew were invented.

Microphone Placing Vital to Measuring Shop Noise

■ Increased emphasis during recent years has been placed on noise control in foundries. The basic instrument for noise measurement is the sound level meter which should always be used in conjunction with analyzing equipment. Essentially the sound level meter consists of a microphone and amplifier, and an indicating instrument.

Select Suitable Height

It is desirable to place the meter and microphone at a suitable height to facilitate adjustment and reading. If a number of measurements are to be made, a cart of suitable height will be of assistance in moving the equipment. Successful readings will depend largely on microphone placement. When measurements are being made to determine noise levels to which a worker is exposed, the microphone must be placed in the region about which he moves.

Most industrial noises are in enclosed spaces. The workman is often about four or five feet from the source. Under these conditions, the sound pressure level will be substantially the same for a relatively large area.

Accurate placement of the microphone is not necessary, three to five feet from the ear being suitable. If the workman is closer than several feet from the noise source, the microphone should be somewhat closer to the ear, and more nearly the same distance to the source as the ear.

Measuring Reverberant Levels

Many measurements made for noise control purposes require that the microphone be placed to measure reverberant levels (levels which include reflected sound from walls, etc.) rather than the direct levels which are obtained relatively close to machinery.

In most rooms, to measure general noise conditions, including reverberation or reflection effects, the microphone distance from the source should be relatively large—10 to 20 feet. If only the direct sound is to be measured then a distance of one to five feet from the source may be more suitable. Purposes of measurement determine the distance.

Where extremely short distances are required, directional and proximity effects must be considered.

This article is based on "The Measurement of Noise" chapter in the American Foundrymen's Society Foundry Noise Manual, scheduled for future release.

FUSET*

CHILL NAILS

*Superior Performance
through
Superior Design!*

* ORIGINAL DESIGN

First open channel chill embodying scientific principles of mass plus surface. Patented design provides more chill and fusion area.

* MASS PLUS SURFACE

Unique combination of two heat-conduction principles permits higher degree of chilling efficiency than ever before obtainable.

* IMMEDIATE CHILLING & FUSION

Balanced arrangement of maximum surface with correct cross section thickness transfers heat faster and enables finest possible fusion!

* IMPROVES QUALITY

Exclusive channel design permits maximum parent metal fill-in around chill—increases casting strength—allows better control of shrinkage and solidification.

* LOWERS COSTS

Less bulk lowers shipping, coppering, storage, plant handling and labor expenses. Fuset efficiency reduces scrap, welding and finishing costs.

*PATENT NOS.

2,731,688, 523,412, 540,053,
1,710,268, 540,888, OTHERS PENDING.
*TRADE MARKS REGISTERED

FUSET* CHILL NAILS ARE MADE IN A WIDE RANGE OF SIZES. EXCLUSIVE FEATURES ARE ALSO AVAILABLE IN FUSET* CHILLS FOR LIGHT OR HEAVY SECTIONS AND FUSIDER* CHILLS FOR A LARGE VARIETY OF APPLICATIONS.

WRITE TODAY FOR
PRICES AND
SAMPLES

CANTON CHAPLET AND CHILL
DIVISION
THE W. L. JENKINS CO.
1445 WHIPPLE RD. S. W.
CANTON, OHIO



**pouring
off
the heat**

no gas at all

■ On reading the excellent article by Robert Colton in the Bonus Section of the July issue of *MODERN CASTINGS* entitled "Defects Due to Melting, Pouring and Solidification," I thought it might be well to mention the flushing method of degassing metal.

I do not favor that school of thought that seems satisfied to have an unknown amount of gas present in all solid metal. The aim of the metallurgist should be to eliminate all gas possible, gating and risering the castings accordingly. In some cases, due to increased shrinkage, modifications will be necessary. The objective should be to have as little gas left in the metal as possible.

As to a small amount of gas causing a more uniform distribution of shrink voids, this a moot question, and it is not practicable to control the amount of residual gas effectively.

The flushing of molten metal with some inert gas, thus removing hydrogen, has much to recommend it. Such flushing should take place in the ladle immediately before pouring, and the particles of gas should be as fine and as uniform as possible. The practice of passing the gas into the metal by means of a straight tube is anything but desirable.

I believe that in years to come gas in any amount will be considered detrimental.

HAROLD J. ROAST
Port Hope, Ontario

patent note

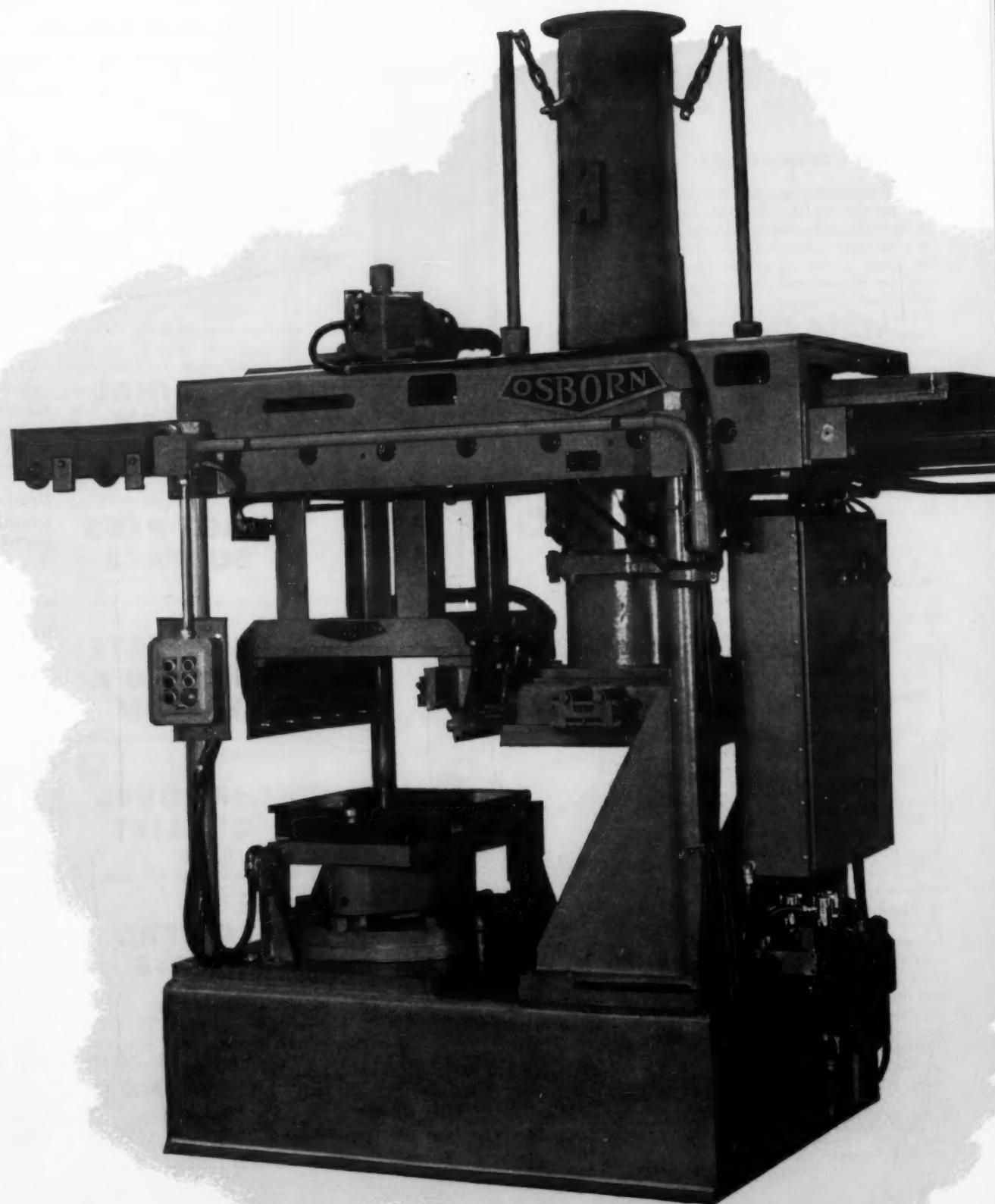
■ In "questions and answers", page 115 of *MODERN CASTINGS* for June, 1957 you advise regarding a successful spray for coating permanent metal molds used for centrifugal casting of cylinder liners.

This is to call your attention to U. S. Patent No. 2,399,606 which may be infringed by spraying the composition suggested in a manner to produce the desired results of insulation and traction for the cast metal.

PEYTON N. FINCH, JR.
Birmingham, Ala.

Patent No. 2,399,606 was issued to U. S. Pipe and Foundry Co. June 30, 1946 and describes a procedure for centrifugal casting—Editor.

new from OSBORN



Circle No. 135, Pages 7-8

Blow-Squeeze-Strip

Molding Machine

for automatic production of top quality molds

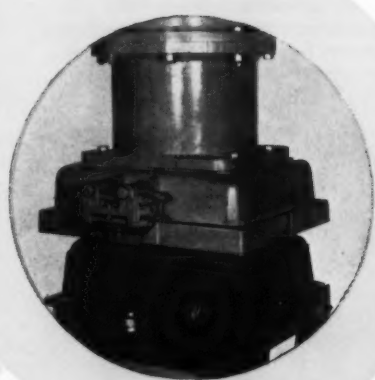
Economical for wide range of work— Whether you have short run, medium or high quantity production, you can profit from this newest Osborn development.

Fast Simple Clean Operation— Molds of unexcelled quality are produced with simplest skills... on preset time cycles. Operator simply loads empty flasks.

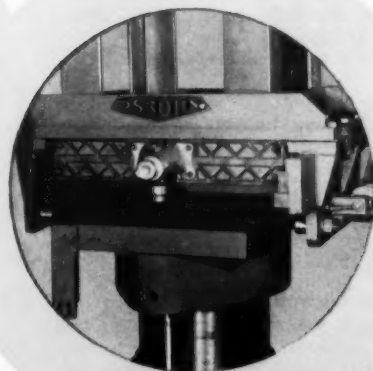
Quality Duplicated on Every Mold— A predetermined volume of sand blown into a preform cavity is squeezed into a flask

and the pattern stripped automatically. Resulting intimate contact between sand and pattern assures superior casting finish. Mold density is uniform, sand spillage is negligible.

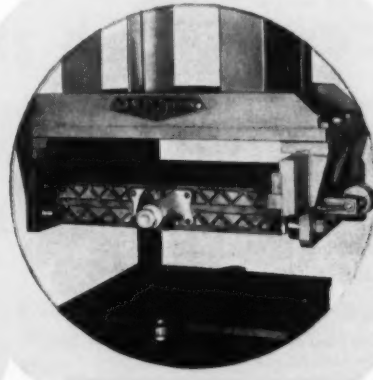
How You Can Benefit Now— Have an Osborn representative study your molding needs. Without obligation, he will show you where this new Osborn machine fits into your molding operations. Write us. *The Osborn Manufacturing Company, Cleveland 14, Ohio.*



Blow—Sand is blown into preform cavity.



Squeeze—Preform is raised and squeezed into flask.



Strip—Pattern is stripped from mold.



... leader in mechanization for the foundry



MOLDING MACHINES

CORE BLOWERS

INDUSTRIAL BRUSHES

BRUSHING MACHINES

SHELL MOLDING MACHINES

Hints on How to Get Most from Materials Handling

Basic restrictions imposed by building limitations are the greatest deterrents to the initiation of effective materials handling methods and equipment, according to W. A. Meddick, Elwell-Parker Electric Co., Cleveland.

To obtain the maximum flexibility for industrial trucks on a non-fixed route basis the following should be considered in plant layout and material flow:

- Locate incoming temporary storage as close to the receiving areas as consistent with their point of original use on processing or assembly lines.
- Where possible, move maximum size loads from storage to work stations. This minimizes the required number of truck trips and also reduces the chance of delays at work stations due to lack of available materials.
- Be sure that trucks which handle loads from the ends of production, assembly and packaging lines, have sufficient capacity and speed and are in adequate numbers to prevent bottlenecks. Where elevators may not be sufficient to handle volume, solution may be found in ramps, chutes or inter-floor lifts.

■ When planning the location of work stations and processing fabrication equipment, allow sufficient area for proper maneuverability of loaded industrial trucks.

Meddick lists these main points to follow for best truck application:

- Check type of building; establish best type of material flow to eliminate backtracking, minimize rehandling.
- Carefully locate work stations, storage areas, and service areas for minimum travel and backtracking.
- Provide elevators in a sufficient number, with the proper sizes and capacities.
- Space building columns for maximum production and storage efficiency, conducive with required ceiling and roof support.
- Make adequate provision for sufficient floor load capacities.
- Provide doorways with sufficient clearances; maintain aiseways wide enough to allow proper maneuvering of trucks plus their loads.
- Establish congestion-free production areas to permit proper travel of trucks to and from work stations and machines.

Circle No. 135, Page 7-8

September 1957 • 21

America's leader in metal abrasives . . .



For over 70 years, Pittsburgh Crushed Steel Company has consistently led the metal abrasives industry—has led in research and product development—has led in the improvement of production methods—and has led in sales and service facilities as well as in distribution facilities!

The results have been better metal abrasives for lower cleaning costs in foundries, forge plants, and steel and metal working plants in general!

Today, through 13 distributing points and 33 sales-service offices, we supply all sizes and types of metal abrasives, iron and steel, for every type of blast-cleaning equipment and for every blast-cleaning requirement!

Our engineering, sales, and service representatives are always available to you in connection with your blast-cleaning needs.

PITTSBURGH CRUSHED STEEL COMPANY

Arsenal Sta. Pittsburgh (1), Pa.

Subsidiaries: Globe Steel Abrasive Co., Mansfield, Ohio

Steel Shot Producers, Butler, Pa.

NOW SOLD IN 50-LB. DOUBLE BURLAP BAGS

Sold by Pangborn Corp., Hagerstown, Md., and by leading distributors of foundry supplies from coast to coast.



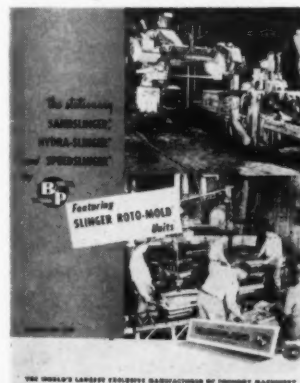
Circle No. 136, Page 7-8

for the asking

Nickel alloy literature check list, 8 pp, contains publications available for specific industries and general technical information. More than 100 publications are listed. *International Nickel Co.*

Circle No. 61, Page 7-8

Sandslinger bulletin, 36 pp, outlines three stationary models using photos and drawings. Each is detailed with



specifications and description of operations. *Beardsley & Piper Div., Pettibone Mulliken Corp.*

Circle No. 62, Page 7-8

Self-dumping hopper catalog, 4 pp, explains how unit may be fitted on fork-lift, platform, or jack-tongue industrial trucks. Holds up to 2 cu yd. *Roura Iron Works, Inc.*

Circle No. 63, Page 7-8

Airless blast cleaning machines, 7 and 14 cu ft models, are detailed in two 12-p catalogs. Construction and mechanical specifications are presented. *Wheelabrator Corp.*

Circle No. 64, Page 7-8

Air engineering data file, 24 pp, covers engineering and test facilities for propeller fans, specifications, construction, maintenance, and installation. Also has tables for estimating air-

handling requirements, entrance and elbow losses and duct sizes. Includes specifications for special-application equipment, corrosion-resistance and temperature guides, physical fan laws, terms, and definitions. *Aerovent Fan Co.*

Circle No. 65, Page 7-8

Grinding wheel catalog, 10 pp, lists line for each purpose with various specifications and explains coding system. *Simonds Worden White Co.*

Circle No. 66, Page 7-8

Binding agent, mixed with dry sand and activator, requiring no ramming, is explained in 4-p bulletin. Also includes recommendations for setting up of daily control charts. *G. E. Smith, Inc.*

Circle No. 67, Page 7-8

Materials handling bulletin, 12 pp, illustrates various overhead handling equipment for production lines, ship-



ping and receiving, and warehousing and storing. *Whiting Corp.*

Circle No. 68, Page 7-8

Industrial tire catalog, 36 pp, describes complete line, variations in pneumatic tire capacities at various speeds, wheel and caster combinations available, manufacturers' tire

specifications, and how to change steel wheels to rubber-tire wheels. *B. F. Goodrich Tire Co.*

Circle No. 69, Page 7-8

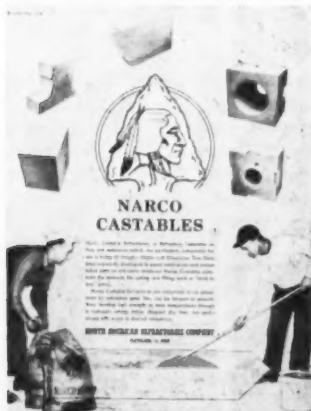
Collapsibility test for shell mold and core materials used with light metals is described in 4-p brochure. Test was formulated by Light Metals Shell Molding Committee of AFS. *Chemical Materials Dept., General Electric Co.*

Circle No. 70, Page 7-8

Silicone catalog, 12 pp, lists complete line including release agents, adhesives, adhesives, diffusion pump fluids, defoamers, heat treating baths, mold lubricants, and protective coatings. *Dow Corning Corp.*

Circle No. 71, Page 7-8

Castable refractories, tamped, poured, or gunned are described in bulletin.



Eight castables are discussed. *North American Refractories Co.*

Circle No. 72, Page 7-8

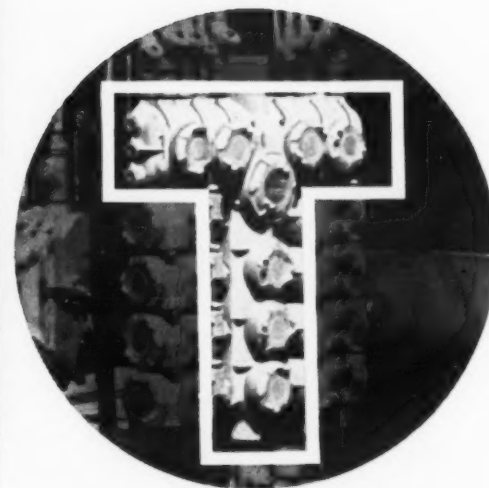
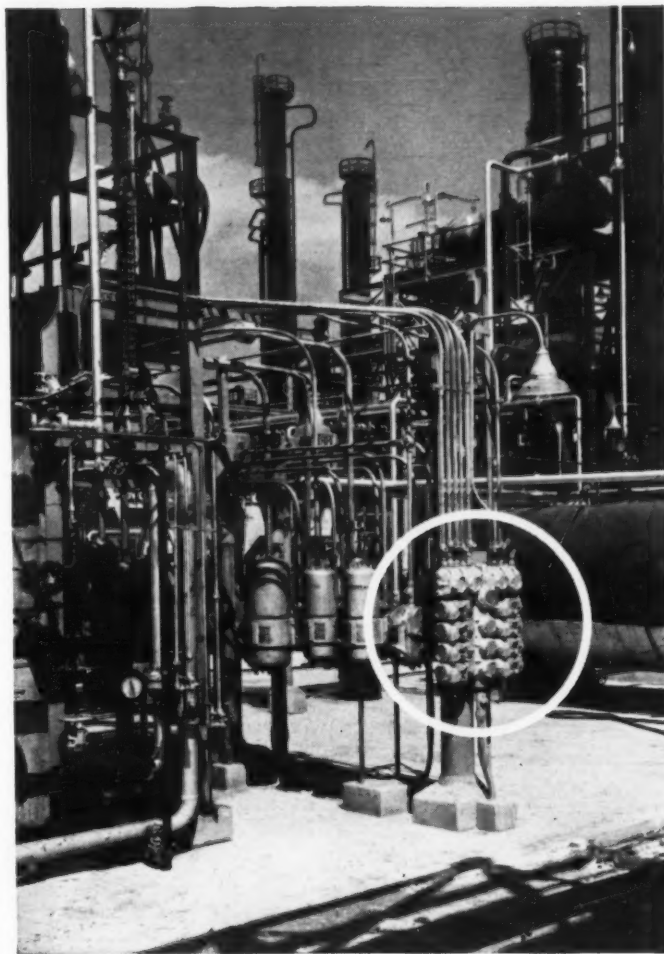
Molding sands, natural bonded, and their role in foundry molding processes is explained in 2-p letter. Chart lists typical foundry operations. *J. David Johnson Co.*

Circle No. 73, Page 7-8

Overhead electric crane catalog, 26 pp, includes models with capacities from 1 to 20 tons and spans to 80 ft. Sections on loads, spans requirements, and motors make it easy to find equipment needed. *Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.*

Circle No. 74, Page 7-8

Refractory manual, 48 pp, describes step-by-step directions for installing brick and ramming mixes in electric furnaces. Contains section on furnace lining repairs and suggests methods for rebuilding and heating-up furnaces. Fold-out chart aids in estimat-



Crouse-Hinds type EDP explosion-proof panelboard installed and operating in an oil refinery. This 12-circuit conduit is built around a single T-shaped casting (outlined above) of dependable Hanna pig iron.

Crouse-Hinds depends on HANNA PIG IRON to keep explosions under control

The explosion-proof panelboard shown above is manufactured by Crouse-Hinds Co., of Syracuse, N.Y., a leading manufacturer of electrical equipment, specifically for use in hazardous locations where certain flammable gases and vapors are present. The cast enclosure *must* be flame-tight, non-porous and of high quality. That is why Hanna iron was chosen for this very important component.

Hanna makes all regular grades of pig iron, plus HannaTite and Hanna Silvery, and all are available in two sizes—the 38-pound pig and the smaller HannaTen ingot. Every Hanna iron has the qualities that produce denser, stronger castings with uniform machining qualities. To obtain prompt, expert servicing of your iron requirements, just call on Hanna or any of our trained representatives.

THE HANNA FURNACE CORPORATION
Buffalo • Detroit • New York • Philadelphia
Merchant Pig Iron Division of

NATIONAL STEEL CORPORATION



Circle No. 137, Page 7-8



Take an
Inside Look at



FOUNDRY COKE

If you could look *inside* a lump of ABC foundry coke, you would see why leading foundries in more than 30 States find it unexcelled for efficient cupola results.

You would see coke qualities found in few, if any, other brands — but essential to discriminating melters.

You would see that ABC foundry coke is a scientific blend of the very finest quality, carefully selected and specially prepared washed Alabama coking coals and low volatile Pocahontas West Virginia Coal — a combination that has never been surpassed.

You would see that the structure of ABC foundry coke is dense, firm and tough, but not brittle, assuring the desired degree of combustibility and minimum breakage in handling.

You would see how control of analyses within narrow limits, improved mechanical equipment and rigid supervision have produced a coke exceptionally uniform in quality and the proper size for efficient melting results and close carbon control.

If you're not already using ABC foundry coke in your operations, give it a trial and see how ABC will improve your cupola performance and reduce your melting costs.

ALABAMA BY-PRODUCTS CORPORATION

General Sales Office: First National Building, Birmingham, Alabama

Sales Agents:

GREAT LAKES FOUNDRY SAND COMPANY, Detroit; ST. LOUIS COKE & FOUNDRY SUPPLY COMPANY, St. Louis; THE RANSON AND ORR COMPANY, Cincinnati; KERCHNER, MARSHALL AND COMPANY, Pittsburgh; BALFOUR, GUTHRIE & COMPANY, LTD., San Francisco; ATWILL COKE AND COAL COMPANY, Chicago.

ing brick requirements. *Kaiser Aluminum & Chemical Sales, Inc.*

Circle No. 75, Page 7-8

Injection process for desulfurizing in the foundry given at AFS regional conference is presented in 24-p reprint. *Linde Air Products Co. Div., Union Carbide Co.*

Circle No. 76, Page 7-8

Thermometer series, including recorders, and recorder-controllers; indicators, and indicator-controllers are described in 4-p bulletin. May be surface or flush mounted. *Wheelco Instruments Div., Barber-Colman Co.*

Circle No. 77, Page 7-8

Bismuth alloys for use in making models, patterns, and molds are outlined in 4-p data sheet listing applications and alloy recommendations. Alloys are non-shrinking and low-melting. *Cerro De Pasco Sales Corp.*

Circle No. 78, Page 7-8

Deburring, abrading, and cutting of delicate materials by a high-speed stream of gas-propelled abrasive particles is described and illustrated in an 8-p bulletin. *S. S. White Industrial Div.*

Circle No. 79, Page 7-8

Blast cleaner wear-resisting parts are explained in 4-p bulletin giving hardness and increased service life figures. Cutaway diagrams show available liner parts. *Pangborn Corp.*

Circle No. 80, Page 7-8

Dust collector, wet type, is explained in 12 pp, showing typical installations, design and operation, and specifications. *Dust Suppression & Engineering Co.*

Circle No. 81, Page 7-8

Crane bid guides are listed for five classes of equipment in 10-p brochure which describes each class as to service life, duties, and bearing life hours. Example illustrates analysis of sample bids. *Harnischfeger Corp.*

Circle No. 82, Page 7-8

Heat resistant alloys are discussed in 14 data sheets. Include specific properties on each alloy and outlines applications, design, and fabricating characteristics of each. Metallurgical structure and characteristics are covered. *Alloy Casting Institute.*

Circle No. 83, Page 7-8

Corrosion-resistant alloy booklet, 104 pp, details four nickel-base alloys giving chemical compositions, physical, mechanical, and high-temperature properties. Also includes table of comparative resistance to over 250 com-

Circle No. 138, Page 7-8

monly handed corrosives. *Haynes Stellite Co., Div. Union Carbide Corp.*
Circle No. 84, Page 7-8

Refractory bulletin 4 pp, covers material said to be used for seven different foundry applications. Water is added to make a ramming mix, soft mud, or mortar. Lists applications and recommended mixtures. *Ironton Fire Brick Co.*
Circle No. 85, Page 7-8

Continuous casting machines for production of heavy and light non-ferrous metals are described and details of machine construction and operation are contained in 4-p bulletin. *Lobeck Casting Processes, Inc.*
Circle No. 86, Page 7-8

Epoxy resin bulletin describes fabrication of foundry pattern equipment. Includes detailed explanation of use in core boxes and patterns in step-by-step procedure. *Houghton Laboratories, Inc.*
Circle No. 87, Page 7-8

Precision investment casting design booklet describes process, details basic design principles, and gives benefits and limitations. Materials chart lists physical properties. *Midwest Precision Castings Co.*
Circle No. 88, Page 7-8

Airless abrasive blast cleaning machine bulletin describes four new models with end-discharge construction allowing cleaned work to pass through at a continuous rate. *Wheelabrator Corp.*
Circle No. 89, Page 7-8

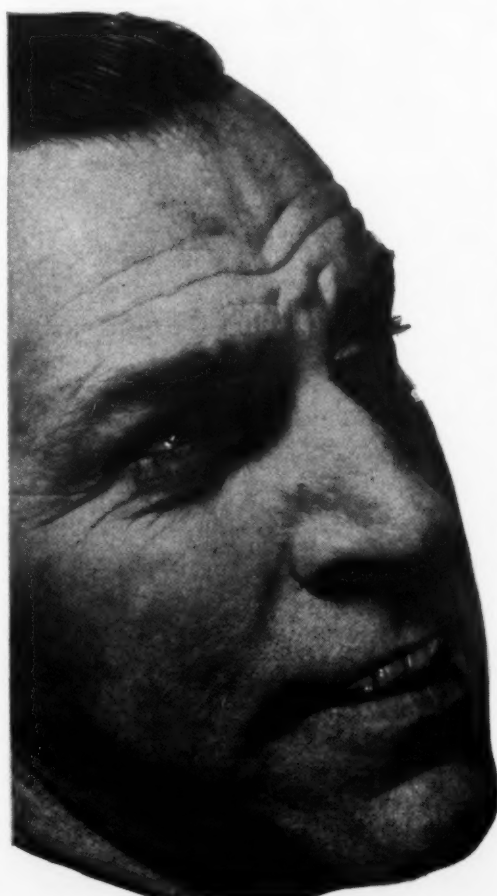
Exothermic compounds, liquidizers and fluxes, are subject of 8-p booklet containing descriptions, directions and applications. *Pittsburgh Metals Purifying Co.*
Circle No. 90, Page 7-8

Investment casting brochure shows how to design, specify, and buy castings. Also shows applications of both frozen mercury and lost wax processes. *Alloy Precision Castings Co.*
Circle No. 91, Page 7-8

Silicone release agents, predominantly inorganic, will not break down at any temperature to form a carbonaceous build-up on molds and dies. Five-page data sheet outlines foundry uses. *Dow Corning Corp.*
Circle No. 92, Page 7-8

Materials handling brochure, 16 pp, shows power and hand equipment. One model floor truck for foundry

They're both right



Man on the left claims that Tru-Steel does the best cleaning job at lowest cost. Fellow on the right swears by Malleabrasive. But they're both right! Tru-Steel is best on some jobs... Malleabrasive is best on others. Different jobs may call for different abrasives but the result should always be the same—the best job at lowest cost per ton of castings cleaned. Whichever you need, Pangborn has the right abrasive for your job. Our sales engineers are experts on abrasives. Ask the one in your area for his advice or write PANGBORN CORPORATION, 1300 Pangborn Blvd., Hagerstown, Maryland.



Pangborn FOR MALLEABRASIVE® AND TRU-STEEL SHOT

Circle No. 139, Page 7-8

operations moves heavy castings. *Lewis-Shepard Products, Inc.*
Circle No. 93, Page 7-8

Industrial welders, AC, are featured in 4-p publication. Includes product features, specifications, power requirements, operating data, and list for optional features. *General Electric Co.*
Circle No. 94, Page 7-8

Automatic sulfur titrator bulletin explains how complete computation for average laboratory analysis of sulfur is done in less than five min. *Laboratory Equipment Corp.*
Circle No. 95, Page 7-8

Dust and fume collector with sluicing bottom cleanout for foundry use, is covered in 8-p bulletin. Independently driven rotor and fan may be adjusted to meet load and operating conditions. *Schmieg Industries, Inc.*
Circle No. 96, Page 7-8

Non-ferrous specifications data book covers brass and bronze, aluminum alloys, and other metals. Chemical and physical properties are shown for typical alloys. Also contains formulae for calculating casting weights. *Colonial Metals Co.*
Circle No. 97, Page 7-8

Epoxy resin foundry applications described in 4-p bulletin. Used in making patterns, core boxes, and molds; also for duplicating and repairing castings. *Devcon Corp.*
Circle No. 98, Page 7-8

Refractory catalog, 24 pp, covers standard and special types of brick and linings for electric furnaces. Also contains thermal conductivity chart for common refractories. *Mullite Refractories Co.*
Circle No. 99, Page 7-8

Chain block safety wall chart shows correct and incorrect methods of using hoists, brakes and slings. Illustrations show the do's and don'ts. *Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.*
Circle No. 100, Page 7-8

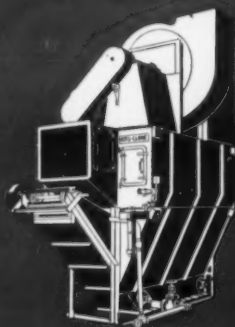
Foundry alloy products book discusses ductile iron additives, ferro-alloys, molybdenum alloys, monel, and nickel. Data section contains conversion table and glossary. *Whitehead Metal Products Co.*
Circle No. 110, Page 7-8

free films

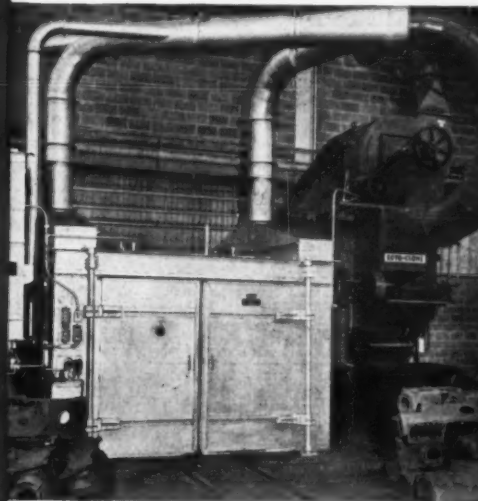
■ Motion pictures and other visual aids based on foundry processes and

Circle No. 140, Page 7-8

Type N ROTO-CLONE

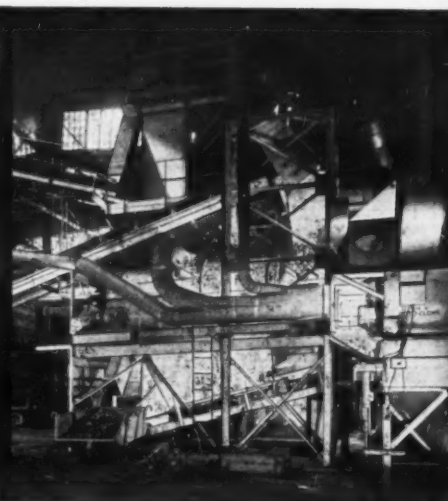


**ABRASIVE
CLEANING
SAND HANDLING**



The Type N ROTO-CLONE is widely used for exhausting both abrasive cleaning (below left) and sand handling operations. High cleaning efficiency of this hydrostatic precipitator results

from the combined action of centrifugal force and the thorough intermixing of water and dust-laden air. Automatic sludge ejector provides for easy disposal of collected material. Bulletin 277.



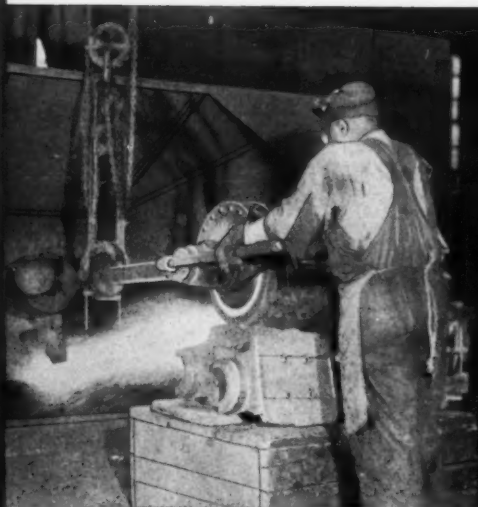
AAF

fights foundry

GRINDING



Type D ROTO-CLONE



The usual recommendation for snag, portable and swing frame grinding dust is the Type D ROTO-CLONE which combines exhaustor and separator in a compact, self-contained unit. It draws in the dust-laden air, delivers the collected material to the storage hopper and expels the cleaned air—all in a single operation with only one moving part: the impeller. Bulletin 272.



High efficiency, low cost and small space requirements make AAF's Type W ROTO-CLONE a favorite for shakeout operations. Water sprays extend the effectiveness of the dynamic forces to the collection of the lightest and finest dust particles. Requires little maintenance, uses a minimum of water and maintains efficiency regardless of variation in air volume. Bulletin 274.

AMERjet



ELECTRIC
MELTING
FURNACE

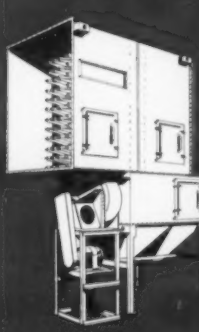
The AMERjet Fabric Dust Arrester is recommended for metallic fumes from electric melting furnaces. Reverse jet principle allows velocities through the cleaning media up to 5 times greater than ordinary fabric collectors. Constant air volume is assured by constant, automatic and continuous reconditioning of cleaning tubes. Bulletin 279.



AAF's AMERclone dry centrifugal, originally designed for boiler fly ash, is the answer to cupola stack gases. Not a cinder-catcher, the AMERclone traps the fine particles that often settle on parking lots and surrounding neighborhoods. One AMERclone handles two cupolas alternately, assuring full-time utilization of equipment. Bulletin 291.



AMERclone



CUPOLA

supplies are also yours for the asking. These films are suggested for formal or informal training groups. The owners of films listed in this column will send booking request forms to MODERN CASTINGS readers who circle the appropriate number on the Reader Service card (pages 7-8).

Casting for Industry, 16 mm, motion picture, color, sound, 23-min running time. A non-technical film. *Foundry Division, Textile Machine Works.*
Circle No. 101, Page 7-8

Safety for Sale, slidefilm, 73 pictures, 52 frames, 15-min running time. Responsibility of supervisor is shown and ways to avoid dangerous practices. *Jam Handy Organization.*
Circle No. 102, Page 7-8

Chaplets, 16 mm motion picture, sound, black and white, 20-min running time. Molding operations showing use of chaplets in foundry. *Fanner Mfg. Co.*
Circle No. 103, Page 7-8

Continuous Casting, 35 mm sound-slide film, color, two parts, 30-min running time. Shows history, engineering details, and applications. *Continuous-Cast Products Dept., American Smelting & Refining Co.*
Circle No. 104, Page 7-8

Shell Molding and You, 35 mm slide film, color, sound, 25-min running time. Step-by-step description of process. *Phenoloic Products, General Electric Co.*
Circle No. 105, Page 7-8

Corrosion in Action, 16 mm motion picture, color, sound 65-min running time, three parts, two reels each. Shows damage and how to avoid losses. *Rothacker, Inc.*
Circle No. 106, Page 7-8

Flow Process and How to Use It, 16 mm motion picture, sound, color, 15-min running time. Shows how to prepare and apply work simplification. *United World Films, Inc.*
Circle No. 107, Page 7-8

Casting Design as Influenced by Foundry Practice, 35 mm filmstrip, sound, 35-min running time. *Meehanite Metal Corp.*
Circle No. 108, Page 7-8

High temperature refractory bonding mortars and their uses are described in 4 pp bulletin 852. *Denver Fire Clay Co.*
Circle No. 109, Page 7-8

Circle No. 140, Page 7-8

September 1957 • 27

dust on all fronts

Where is process dust causing you trouble?

GRINDING? SHAKEOUTS?
ABRASIVE CLEANING? CUPOLAS?
SAND HANDLING? MELTING FURNACE?

Only a complete line of versatile dust control equipment can successfully fight the plant-wide battle against foundry dust. And the world's most complete line is AAF. It includes hydrostatic precipitators, dynamic precipitators, dry centrifugals and fabric arresters.

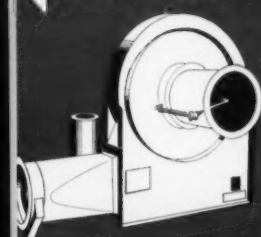
AAF's 20 years experience in foundry dust control assures the right unit for every dust-producing operation, regardless of

type of dust or concentration. Every product in the line, what's more, offers the basic design features you expect from AAF:

- Small space requirements
- Maintained performance over a wide range of operating conditions
- Constant exhaust volumes
- High collection efficiency

Here they are—AAF's "stable of champions" for foundry dust control. One of them will answer *your* dust problem. For more information on any or all, call your local AAF representative or write direct.

SHAKEOUTS



Type W ROTO-CLONE

AAAF

herman
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American Air Filter
COMPANY, INC.

104 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

Herman Nelson
Portable Heaters



Illinois
Heating Specialties



AAF Electric
Furnace Hoods

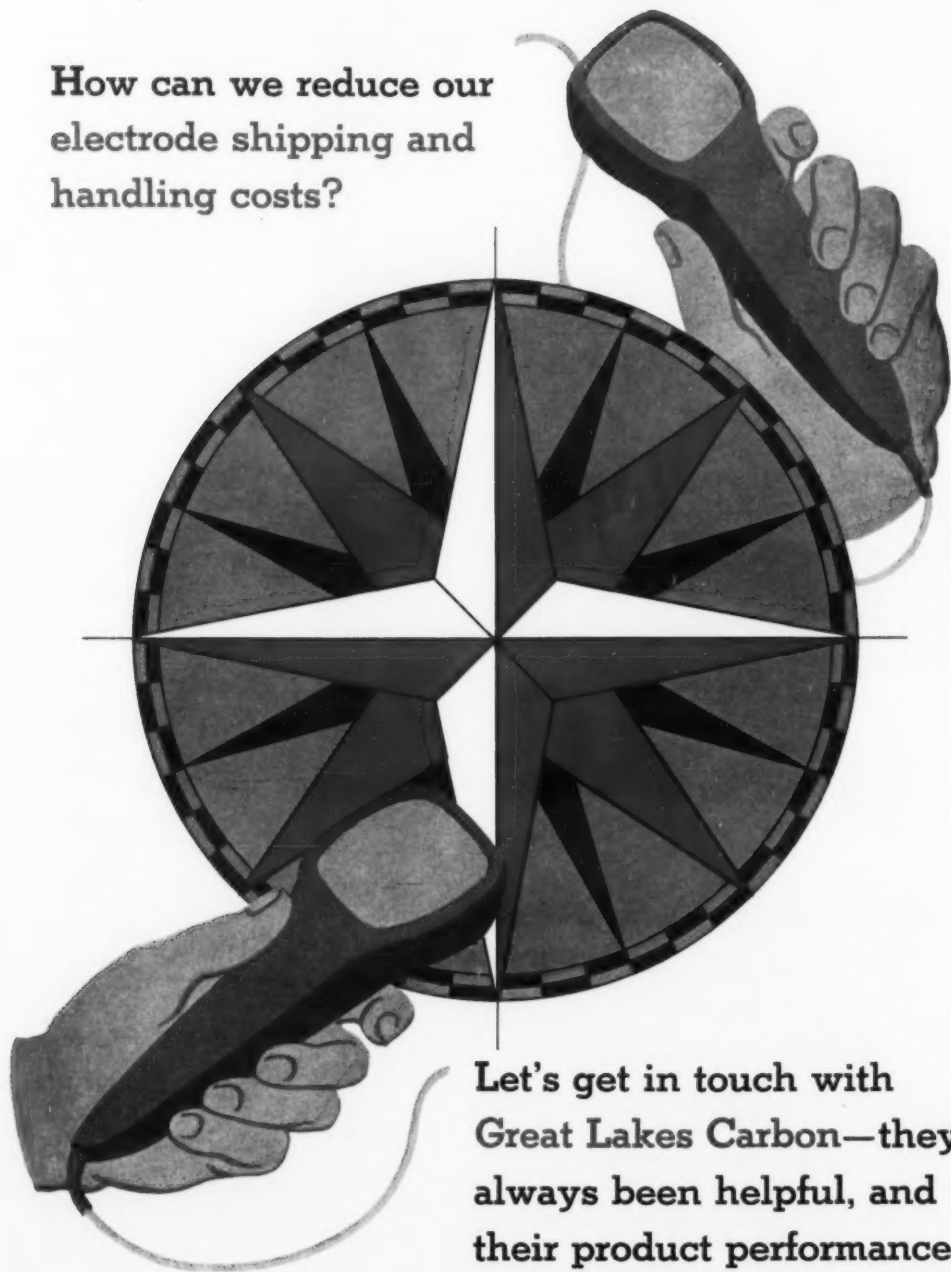


AAF Type K
Exhauster



BETTER AIR IS OUR BUSINESS

How can we reduce our
electrode shipping and
handling costs?



Let's get in touch with
Great Lakes Carbon—they've
always been helpful, and
their product performance
is outstanding!



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Effective Scrap Control

HENRY FELTEN*
Peoria Malleable Castings Co.
Peoria, Ill.

Effective scrap control is based on four basic steps. These are: collecting information, analyzing the problem; investigating causes; and taking corrective action.

A program based on these steps will result in a consistent reduction in scrap. Management will be able to predict scrap losses and to assign causes; supervisors will be able to outline corrective action; and workmen will be assured of a fair method of assigning scrap causes.

In theory, the program makes every production job an average job so that total scrap losses are brought under control.

Collecting data must be done daily. Casting types must be classified into specific areas for control.

Analyzing the data makes it possible to determine whether the major problem is with misruns, sand inclusions, slag, shifts, strains, or other defects. The ground work is then prepared for dealing with the four fundamental factors entering into the production of castings—machines, materials, methods, and men.

It is this type of evidence which the practical foundryman can understand; and, confronted with this evidence he is receptive to properly directed corrective action.

Investigating deals with the causes of control failure in the various processes. It can take many forms depending on the process requiring study. The more data accumulated, the more conclusive will be the evidence.

Corrective action is the heart of the scrap control program. Management must assume the responsibility for failure and take the necessary steps when the evidence calls for immediate action.

Only if the production unit disciplines itself to faithfully carry out these practices will it result in continued control of the whole operation. The progress and success of the system will be revealed on master control charts.

Standard practices must be established for each part of the process in keeping with the results of the investigation.

A scrap reduction program is like a tool in the hands of a workman; it will produce a finished product commensurate with its intelligent use.

* This article is based on a talk given at the Penn State Foundry Conference, June 20, 1957.

MULEHEAD PETE

Oh, I say, Stranger, did you ever
meet
That stubborn guy called Mulehead
Pete?
Mulehead Pete, who says only fools
Pay any attention to safety rules.

He turns his back when he hooks up
the chains;
He walks under loads suspended on
cranes.
He never wears goggles, safety shoes
on his feet;
Never dons spats or gloves when
pouring a heat.

Ignores bells and sirens like a man
without ears;
Shoves his feet under ladles, his fin-
gers in gears.
If you caution the guy, old Pete
just says, "Phooey."
These safety rules are just so much
hooley!"

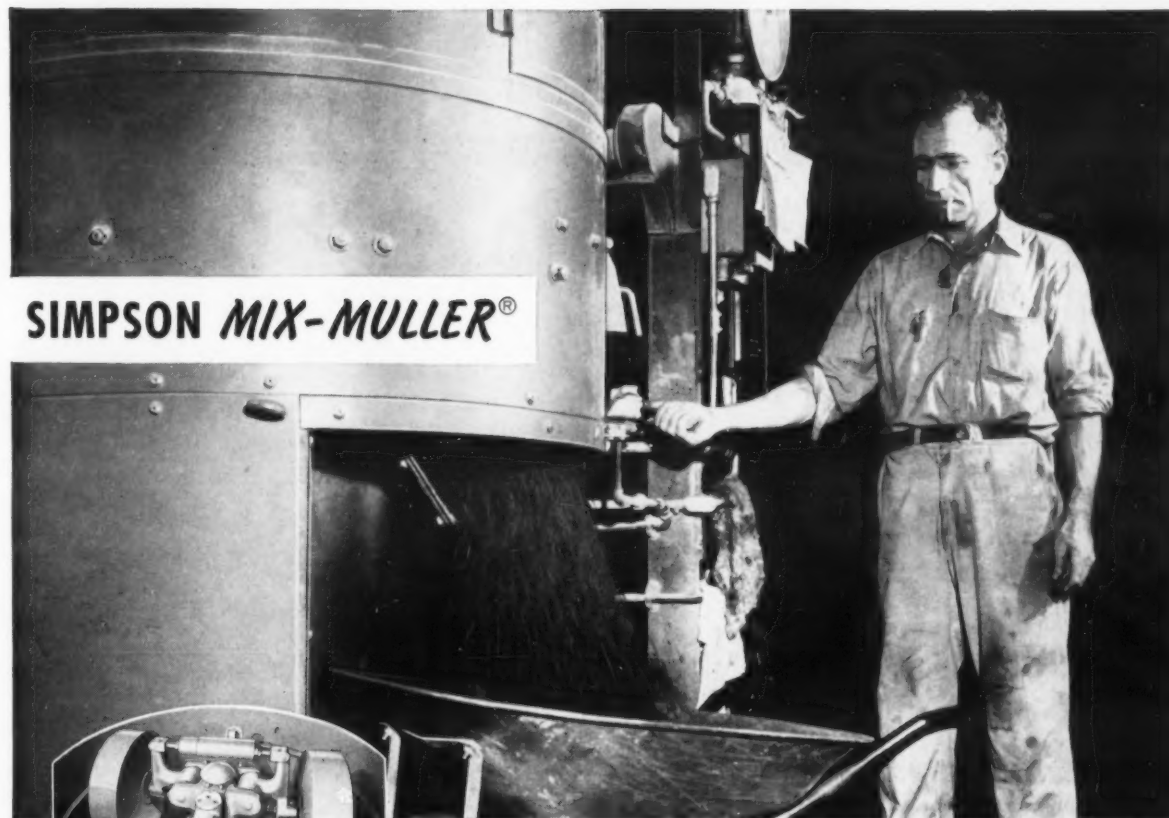
Did I hear you say that you wanted
to meet
This reckless dude called Mulehead
Pete?
You won't have to wait, because, I
swow!
Here he comes down the gangway
now.

He's that one-eyed guy with the
broken nose,
The scarred-up face as red as a rose.
He braces his back with corsets and
bands;
There's two fingers missing from each
of his hands.

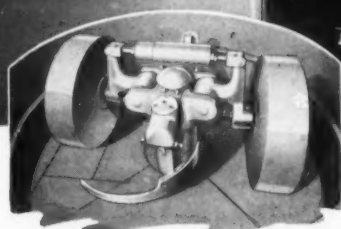
His broken jaw makes him lisp when
he talks;
Big toe cut off, so he limps when
he walks.
His skull's been cracked, his ribs
caved in.
He's a damned good workman—for
the shape he's in!

If you want to keep singing till the
song's all sung,
If you don't want to die while you
are still young,
If you want to wind up on Easy street,
Better take a good lesson from Mule-
head Pete.

■ From *The Foundry Bard*, a col-
umn of foundry poems appearing in
The ESCO Ladle of the Electric Steel
Foundry Co., Portland, Ore., Bill
Walkins, former sand mill operator,
is both the editor of the *Ladle* and
the one, and original Foundry Bard.
GANDY DANCE which appeared in
the July, 1957 issue of *MODERN CAST-
INGS* was also from *The Foundry
Bard*. Credit lines were inadvertently
omitted. Sorry, Mr. Walkins, MC just
danced away with it!



SIMPSON MIX-MULLER®



**THESE FEATURES
make sense to foundry men:**

LOW POWER REQUIREMENTS



Stationary pan prin-
ciple brings mulling
action to the sand
mass. Power used—
is used to mix sand.

EASE OF MAINTENANCE



Simple, rugged de-
sign makes Simpson
Mix-Muller safe and
easy to operate,
understand, and
maintain.

UNIFORM CONTROLLED MIXING



An intensive muller,
the Mix-Muller pro-
vides thorough dis-
persion, even tem-
pering for any and
all types of sand used
in the foundry, in-
cluding CO₂.

BOTTOM DISCHARGE

empties pan quickly, thoroughly, automatically

To discharge any model of the Simpson Mix-Muller all you do
is open a door in the bottom of the pan. The mixer is emptied
quickly, (up to 4,000 lbs. in 20 seconds) and *thoroughly* by plow
action. No extra power is needed to elevate the sand.

Simplicity is inherent in the design of the Simpson Mix-Muller.
Any machine that pays off in a foundry operation must be
rugged, easy to clean . . . easy to *get at* for routine maintenance
and lubrication. Simpson Mix-Mullers have been filling these
basic requirements for over 45 years. The newer F Series Models
provide centralized lubrication, V-belt drive; a removable crib
section for easy access combined with the most thorough, con-
trolled mulling action ever developed!

They are described in Bulletin 511 and are available now in
a range of sizes from 50 to 4,000 lbs. batch capacity. Write for
details today.

Mixing and the integration of mixing equipment—is our business.



NATIONAL Engineering Company

630 Machinery Hall Bldg.,

Chicago 6, Illinois

Circle No. 142, Page 7-8

Idea-Exchange

Creates Economical Castings Design

Reduction of casting costs without sacrificing quality is a moving target which can only be hit by well-designed castings. A compromise in thinking by all persons concerned is the key to good design coupled with economy. Design engineers, patternmakers, foundrymen, and machinists must blend their ideas for producing an engineered casting by literally "exchanging heads."

Although many of us specialize in the design or manufacture of castings, I am not so sure that any one of us has all the answers for the best design or the best manufacturing process in terms of the best economy. The engineer may design a casting to be mechanically satisfactory for its function. He may have simplified every mechanical detail only to find that the casting is too complex and costly to produce in the foundry.

Exchanging Heads

I am quite sure the manufacturer is desirous of getting the most for his money. Everyone concerned,

GEORGE W. SCHULLER /
Pattern Shop Superintendent
Caterpillar Tractor Co.
Peoria, Ill.



Design engineers, patternmakers, foundrymen, and machinists must blend ideas into product

To reduce and control prices and costs is the basic theme of good casting design. The cheapest method is not necessarily the best approach to produce what is considered a well-designed casting. Neither is the most expensive method the answer. A compromise of thinking by all people from the designer to the machinist and even the assembler is absolutely essential. In other words, we must "exchange heads."

When this is done we arrive at control. When control is practiced so as to overlap into the next person's thinking or problem we begin to arrive at economy. When all people have explored all their methods of controlled economy, and relayed their thinking to the engineer or designer, then we arrive at a compromise in casting design that is acceptable by all and considered to be well designed for producing quantities economically.

The Foundryman's Interests

Though foundrymen may consider many elements essential to produce good castings economically, the following three basic rules are considered most important:

1) Plan for a Sound Casting

Four major suggestions to remember are shown in Fig. 1. In line "a," the sketch on the left of each pair of illustrations shows the original design of a casting while the sketch on the right indicates the suggested improvement.

In Fig. 1, line "b," the sketch on the left of each pair of illustrations could be a heavy isolated boss or section of metal while the right-hand sketch suggests an improved condition so a risering or feeding system can be used. Feeding heavy sections is much more desirable than the use of chills if the design can be changed to accommodate a reasonable risering system.

The cross-section shown in line "b" is a 13 in. diameter by 7 in. high pulley. Three belt grooves are turned in the OD, each being 7/8-in. wide by 3/4-in. deep. The wall between the upper and lower belt grooves is 7/32-in. thick. The wall connecting the center hub with the belt grooves is 1-1/2-in. thick to accommodate a series of

from the designer to the machine shop superintendent, must "exchange heads," so to speak, to get the most for the least cost.

How many times have foundrymen criticized a casting design and wondered why the engineer desired certain contours and shapes that are costly to produce? How many times have foundrymen wished the engineer had a little more foundry understanding so he would know when heavy sections or thin sections should be used for economical foundry practice?

Yes, criticism of casting design can be done by many. Just about any casting, regardless of design, is possible to make—at a price! Whether this price is profitable when quantities of the same casting are desired becomes a point for study of all processes.

SUGGESTED HINTS FOR GOOD DESIGN

① PLAN FOR A DENSE, SOUND CASTING



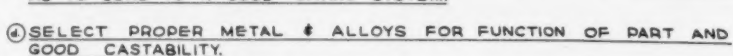
② USE AS UNIFORM SECTION AS POSSIBLE FOR AS EQUAL SOLIDIFICATION AS POSSIBLE



③ AVOID ISOLATING HEAVY SECTIONS WITH LITTLE OPPORTUNITY TO FEED OR RISER



④ PLAN PROGRESSIVE SOLIDIFICATION OF VARIABLE THICKNESS WALLS SO AS TO LEAD TO A GOOD GATING SYSTEM



⑤ SELECT PROPER METAL & ALLOYS FOR FUNCTION OF PART AND GOOD CASTABILITY

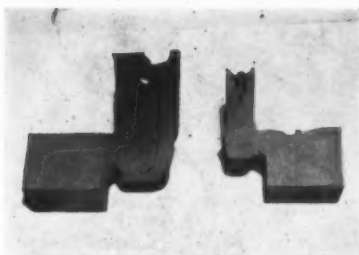


Fig. 2 . . The difference the riser can make in soundness.

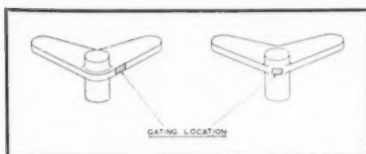


Fig. 3 . . Gated hub allows the use of an adequate riser.

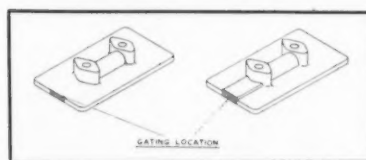


Fig. 4 . . Small design change can make a big difference.

tapped holes.

The foundryman could cast the grooves solid, creating 1-1/4-in. thick sections of metal with 7/32-in. thick walls between them or core the grooves allowing ample finish. The latter leaves little area on which to attach any gating system.

Line "c," the two sketches on the left, are overemphasized illustrations to show transition from

thin to heavy sectioned walls. If actual castings were made similar to these overemphasized illustrations and risered on heavy end, the castings would be dense and sound as solidification is progressive and fed by riser. The left-hand sketch of each pair exemplifies undesirable design which is improved on right so as to achieve directional solidification. Line "d" emphasizes the importance of metal selection.

Sometimes the design may appear simple but the function of the casting may either increase or decrease the casting cost. Let us consider a simple block-shaped casting measuring 4x5x8 in.—intended as a weight or perhaps a spacer. Foundrymen can produce this casting in quantities with correct dimensions. However, if the casting is sawed in half, the center portion of the casting may show some

porosity or shrink and yet be a good commercial casting for this particular function.

On the other hand, let us assume the same design is to be used as a casting for a hydraulic unit. Many holes are to be drilled. Some of the holes have 1200 psi oil pressure in them. The casting must be sound and free of any leaks between drilled holes. Even though the casting is the same design as the weight, the foundryman has an entirely different problem. He must riser or feed the hydraulic casting to a greater degree than necessary for the weight.

The alloy also probably would be changed. Fig. 2 shows a sound dense casting on the left with a large riser for feeding while casting on right shows shrink and porosity. Note the yield difference between castings.

Figures 3 and 4 show improvements in design so castings can be adequately gated for soundness. In right-hand sketch of Fig. 3 note the improvement by changing flanges at junction of hub so adequate risering can be used. The left sketch allows no way to approach hub through the flange. Figure 4 shows isolated heavy section in left sketch with improved method of feeding on right.

2) Plan for Moldability

How a piece is to be cast or how much thought is given to casting design may depend on the number of castings required. Although thought is required for good design on low requirement castings, prime economy is achieved in design for high-production.

FOR GOOD DESIGN PLAN FOR MOLDABILITY

- Anticipate daily or monthly requirements in planning both design and moldability.
- Design to simplify pattern and core box parting to eliminate or minimize external coring and minimize internal coring.
- Provide ample holes to support and locate internal coring and provide access for thorough cleaning.
- Plan for gas vent hole take-off and possible use of chaplets.

The foundryman usually likes: 1) pattern and core box partings to be as simple as possible; 2) reduction in the number of cores needed; 3) ample core support and possible addition of holes through which to utilize core venting systems if necessary; 4) to know needs for chaplets, what type and where they are placed; 5) ample space to place the necessary gating or risering systems; 6) the proper flask equipment and the proper amount of sand above the pattern to prevent distortion. Figure 5 is a cross-sectional view of a sand mold incorporating these practices.

A 76-lb jacketed manifold, 6-in. diameter at body and 34 in. long, was designed to simplify molding conditions, eliminate coring and provide holes for cleaning casting and venting jacket cores.

Figure 6 shows the pattern designed for this job and used on a jolt-squeeze molding machine. Figure 7 is the rough casting ready for painting.

3) Minimize All Costs of Producing Castings

The foundrymen working with

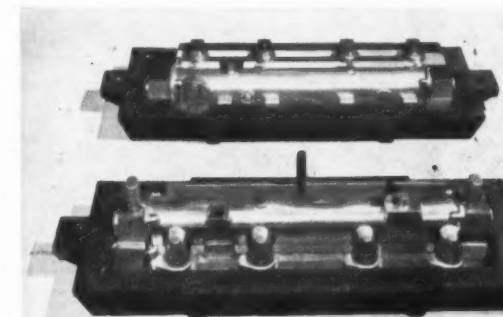


Fig. 6 . . Pattern for job designed to eliminate cores, aid molding.

Fig. 7 . . Finished manifold from pattern (above) is quality work.

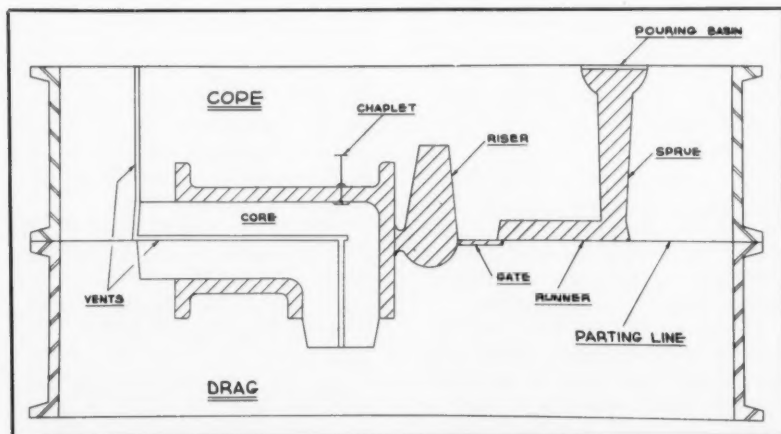


Fig. 5 . . This ideal set-up in sand will produce minimum scrap.

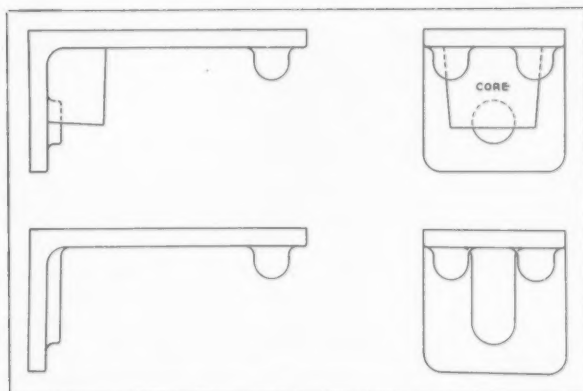


Fig. 8 . . Core was eliminated by extending boss.

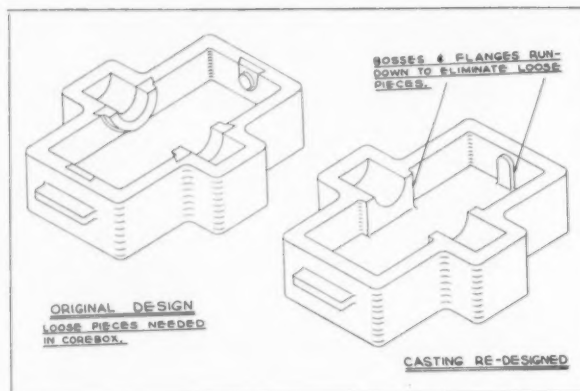


Fig. 9 . . Longer bosses eliminate loose pieces.

pattern shop personnel can do much to improve casting design so better control of castings at lower costs can be achieved.

An example of eliminating a core by extending boss to flange is shown in Fig. 8. Loose pieces can be eliminated in core boxes by extending bosses and bearings as shown in Fig. 9. Removing or grinding of gates from round surfaces is sometimes inaccurate and unsightly. The left view of Fig. 10 shows round surface from which gating must be removed while the right improved design has flat area on which gating can be fastened and easily removed.

Figures 11, 12, and 13 show some drastic changing in design so coring is eliminated completely

and castings are made in green sand.

The left view of Fig. 11 shows the bracket as originally designed and the right view shows the pattern utilizing a core. The bottom view shows a much neater and stronger redesign eliminating core and simplifying cleaning of casting.

Figures 12 and 13 are wood models made to show the engineer advantages of redesign. The left view in each figure is the original design while the right view shows suggested redesign to simplify molding and eliminate coring. Note the coring that would be necessary as originally designed for each part. Although the model in Fig. 13 for a rocker-arm bracket shows holes, it was cast solid.

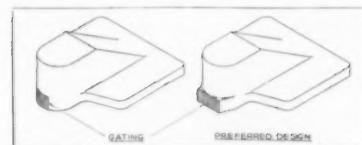


Fig. 10 . . Design with flat area is easier to gate, clean.

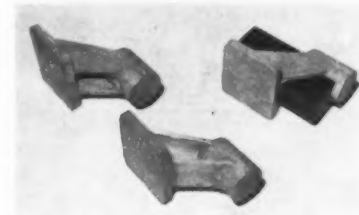


Fig. 11 . . Patterns illustrate designing to eliminate cores.



Fig. 12 . . One basic design made with and without cores.



Fig. 13 . . Redesigned bracket is intended to be cast solid.

FOR GOOD DESIGN, HOLD DOWN PRODUCTION COSTS

- Utilize best equipment or machines in your foundry.
- Plan for multicavity molds but do not over-crowd. This may cause swelled castings, inefficient gating, shifts, etc., resulting in false economy.
- Simplify all pattern equipment to eliminate unnecessary coring, loose pieces in core boxes, and possible special equipment.
- Utilize checking or gaging devices on intricate cores or assemblies to avoid scrap castings.
- Plan for ease of cleaning and grinding.
- Utilize target and checking fixtures to grind or mill locating pads on large or complicated castings.

Figure 14 shows partly completed cope and drag pattern equipment for the rocker-arm bracket to be used on a jolt-squeeze machine with four in a mold.

The Patternmaker's Interests

The pattern shop has and should continue to have a great role to play in good casting design. Pattern shop personnel must understand foundry practice and technique. They must be in direct contact with the foundryman to understand and help solve many problems. Through the combined efforts of each, the result of good casting design becomes a reality.

It is certainly true that a casting is no better than the pattern equipment from which it was made. The pattern equipment may be constructed with a particular sized shrink rule and be dimensionally correct with the rule, yet produce castings that are dimensionally inaccurate. The casting is the product to be correct and the pattern equipment must be made or adjusted to obtain the desired result. Basic shrinkages of each metal must be known.

The patternmaker must know in advance what shrink rules to use. In other words, keep a log or record in the pattern shop of the inaccuracies occurring in castings made from pattern equipment.

Shrinkage of the metal is but one factor for the patternmaker to overcome. Expansion of oil sand cores when surrounded by molten metal is another. Sag and distortion of cores in the green state is

still another. Providing proper clearances between the fit of the cores and mold is important. All these factors are important to the patternmaker and necessitate his being in constant contact with the foundryman to produce quality-controlled castings.

Pattern personnel should classify each design of casting by constant study and record results to determine the proper shrinkage allowance and method of pattern construction.

"V" and "U"-shaped castings, for example, have tendencies to spread or open up at the open ends of the "V" or "U." The casting design



Fig. 14 . . This is the partly completed pattern equipment which would be used to produce the redesigned part illustrated in Fig. 13.

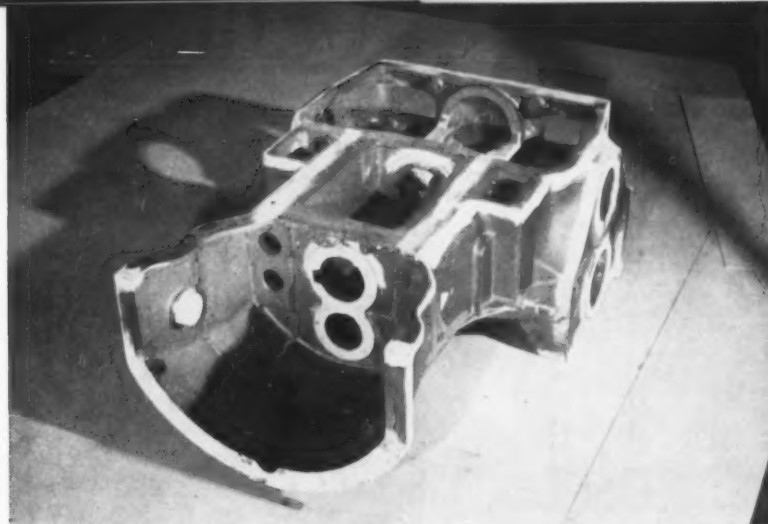


Fig. 15 . . Castings designed with "U" or "V" ends will spread and this spread must be overcome. This casting opened about 3/16-in.

determines the degree of spreading. Compensations can be built into the equipment to overcome the spread or tie bars can be cast to hold the open ends and removed later. Tie bars, however, may create stresses in the castings when removed and should be used with caution.

Figure 15 shows a large 980 lb transmission case with a "U" opening. The spread of the open end was approximately 3/16-in.

Foundry personnel should study all detail of casting design and pattern design with the pattern personnel. This affords everyone concerned the opportunity to select foundry equipment to be used and decide how pattern equipment should be built. Any change of original casting design should then be discussed with the engineer.

We also have in our engineering department a patternmaker who is familiar with our foundry practice and pattern design. He does not make patterns, but acts as an adviser and works with the designers. He suggests changes in casting design from a foundryman's viewpoint and helps to simplify moldability, eliminate excessive coring, etc. He is in constant contact with the foundry, pattern shop and engineers. **We feel having such a person in the engineering department has saved thousands of dollars and helps to knit the thinking between engineer and foundryman.**

The Machine Shop's Interest

I believe the interest of the machine shop can be summarized very

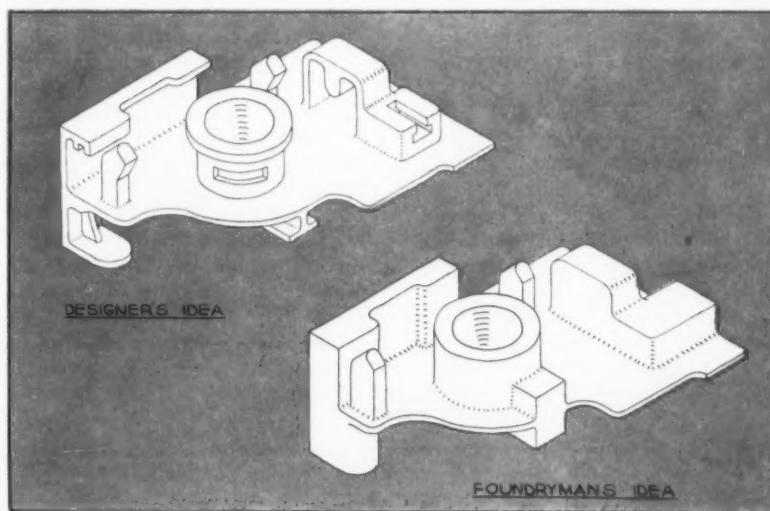


Fig. 16 . . Somewhere between the designer's idea and the foundryman's idea is a compromise that is the answer to good design and economy.

easily. Machinists desire all castings consistently alike. The material should be consistently machineable. The amount of finish to be removed should be minimized and be consistently the same. This is the goal the foundryman must meet.

The Engineer's Interest

The engineer builds into his idea the necessary mechanical features so the part will function. He desires the right material for the job. He wants all stresses to be at a minimum. The casting should have a good appearance. He is usually eager to accept the foundryman's opinion and make reasonable com-

pensations in design. He is anxious to incorporate the machinist's needs to fixture, locate, and minimize machining operations.

When each of us have "exchanged heads" and used the engineer as a clearing house to finalize design, then we have arrived at good economical casting design.

Figure 16 is an over-emphasized version of the designer's conception of good casting design. This design may be too costly for the foundryman. On the other hand, the foundryman's idea may have simplified the casting cost, but is too costly to machine. **A compromise is the real answer to good design and economy.**

THE DESIGNERS

The designer bent across his board
Wonderful things in his head were stored.
And he said as he rubbed his throbbing bean
"How can I make this thing tough to machine?
If this part here were only straight
I'm sure the thing would work first rate.
But t'would be so easy to turn and bore
It would never make the machinist sore.
I'd better put in a right angle there
Then watch those babies tear their hair.
Now I'll put the holes that hold the cap
Way down in here where they're hard to tap.
Now this piece won't work, I'll bet a buck,
For it can't be held in a shoe or chuck.
It can't be drilled or it can't be ground
In fact the design is exceedingly sound."
He looked again and cried—
"At last—
The dog-gone thing can't even be cast."—Anon.

AFS PROMISES SUPER SHOW IN '58

Equipment builders report revolutionary developments being readied for Cleveland exhibition

Revolutionary tools to aid the castings industry in its battle for competitive advantage are now in advanced planning stages according to reports of activities at the conference tables and drafting boards of leading foundry equipment builders.

Mechanization for jobbing foundries, automation for production shops, and equipment using radio isotopes in sand preparation are among the developments equipment producers will unveil in Cleveland May 19-23, 1958, at the AFS Castings Congress and Show.

Because of the unusual activity of equipment producers, the AFS Exhibits Department will begin its assignment of exhibit space for the show on October 1, earliest assignment date in the show's history. The early space assignment will permit exhibitors to start designing and building the extensive displays

expected at the show, according to AFS Exhibit Manager Wm. N. Davis.

The floor plan of exhibit spaces in the vast Cleveland Public Auditorium has already been released to firms expecting to have exhibits at the show.

Equipment manufacturers report that they will be showing new equipment of vital importance to the cast metals industry. B. L. Simpson, president, National Engineering Co., Chicago, states that he expects to see more new products and new developments on display than at any time in the history of the exhibition. He also reported that his firm is "deliberately withholding some outstanding developments because we think the AFS Show is the best place to introduce them."

The reason for the expected showing of much new equipment

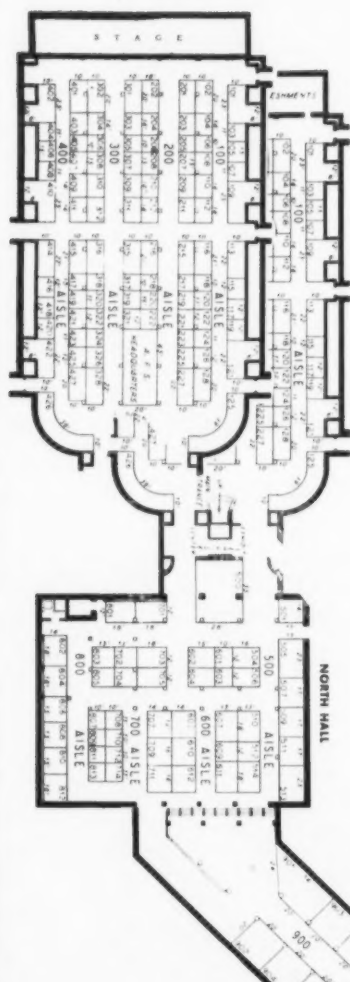
is indicated in a statement by C. V. Nass, vice-president and general manager, Pettibone-Mulliken Corp. Beardsley & Piper Div., Chicago. He remarked that, "Steadily increasing costs of operation are of the utmost concern to all foundries, and our efforts at the Cleveland show will be aimed at showing foundrymen how to reduce costs in a 'point-the-way' exhibit. Low cost, highly flexible mechanization for the jobbing foundry, and higher productivity through automations for the high production foundry will be the keynote of our exhibit."

Members of the AFS Exhibitors Committee, the group of exhibitor's representatives who approve regulations for conducting the displays, expect the show to draw a vast national and international audience. The nine previous shows held in Cleveland have attracted large local audiences because of Cleveland's location in an area of diverse foundry operations.

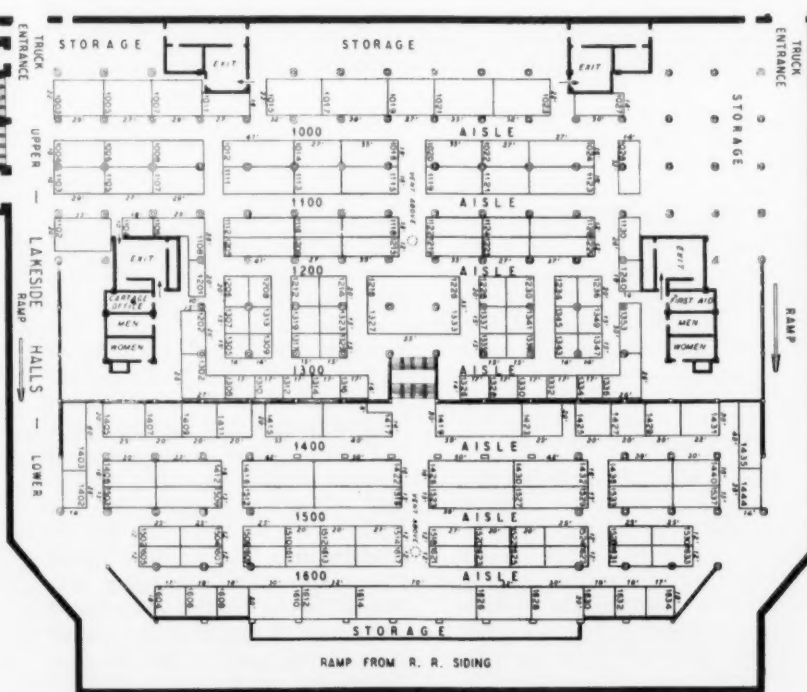
Many other visitors are particularly attracted to an exhibition in Cleveland because of the opportunity for local plant visitations arranged by the AFS Northeastern Ohio Chapter.

The closing day of the show, Friday, May 23, will be Northeastern Ohio Day when the show will be open without charge to employees of the foundry and allied industries in the Cleveland area. Special admission cards will be distributed by the AFS Northeastern Ohio Chapter and all exhibits will be operated continuously until 5:00 pm.

Cleveland hotels have guaranteed AFS a supply of hotel rooms considered adequate for housing all exhibitors, members, and guests. Hotel application blanks will be distributed by AFS to all members and exhibitors early in January, and all hotel room assignments will be made by an official AFS Housing Bureau.



Operating exhibits and centers of interest for visitors will be located in every one of the halls of the Cleveland Public Auditorium. 1958 AFS Show will use 20 per cent more space than the 1954 show in Cleveland. Floor plans for the '58 show have now been sent to exhibiting firms.





STOP

FOUNDRIY ACCIDENTS

A MODERN CASTINGS

— BONUS —

This special report is the 26th in a monthly series presented by MODERN CASTINGS to analyze vital problems in the industry. Reprints of this section are available in limited quantities. Prices: 50 cents for single copies; 20 cents in quantities of five or more.





STOP ACCIDENTS

ACCIDENTS COST MONEY and MISERY

Two types of costs are involved in every accident: direct and indirect. Direct costs of an injury, (compensation and medical expense) are apparent. Hidden costs are not always immediately recognizable, yet they are usually much greater than the direct costs. Among the hidden costs which must be considered are:

- 1) Cost of wages paid for time lost by workers who were not injured.
- 2) Cost of damage to material and equipment.
- 3) Cost of wages paid for lost time by the injured workmen other than workmen's compensation payments.
- 4) Extra cost due to overtime work necessitated by the accident.
- 5) Cost of wages paid supervisors while their time is absorbed by the accident.
- 6) Wage cost due to decreased output of injured workers after return to work.
- 7) Cost of learning period of new worker.
- 8) Uninsured medical cost borne by the company.
- 9) Cost of time spent by higher supervision and clerical workers on accident investigations or processing compensation applications.
- 10) Miscellaneous unusual costs.

Insurance

In some jurisdictions businesses may be eligible for experience in-

■ The accident frequency rate for the castings industry is higher than the national average for all industry. Compensation benefits paid to injured workers are rising, giving foundrymen another reason to STOP FOUNDRY ACCIDENTS.

In some areas the safety problems of the castings industry are receiving special attention from government agencies. New York State is presently making a safety drive on foundries. The Province of Ontario is proposing a separate health and safety act for foundries while other industries will fall under a general factory act.

This Bonus Section is designed to help foundrymen carry out an effective safety program. Material in this section is drawn from the new American Foundrymen's Society publication, RECOMMENDED SAFETY PRACTICES FOR THE PROTECTION OF FOUNDRY WORKERS IN FOUNDRIES.

■ Members of the Safety Committee which developed the manual are: John W. Young, chairman, International Harvester Co., Chicago; Eldon M. Altman, Hamilton Foundry & Machine Co., Hamilton, Ohio; M. F. Biancardi, Allis-Chalmers Mfg. Co., Milwaukee; Leonard Cole, Crane Co., Chicago; Wm. N. Davis, American Foundrymen's Society, Des Plaines, Ill.; Walter Hanau, Fidelity & Casualty Co. of New York, Chicago; Kenneth S. Hedges, General Motors Corp., Detroit; A. C. Hensel, Albion Malleable Iron Co., Albion, Mich.; B. A. Hindmarch, American Steel Foundries, Chicago; T. A. Kraklow, Deere & Co., Moline, Ill.; H. S. Simpson, Caterpillar Tractor Co., Peoria, Ill.; L. C. Smith, National Safety Council, Chicago; E. J. Wallman, American Brake Shoe Co., Chicago; Arthur J. Zahn, Eaton Mfg. Co., Foundry Div., Vassar, Mich.; Herbert J. Weber, AFS Director of Safety, Hygiene and Air Pollution Control Program. Special illustrations were furnished by the National Safety Council, the American Optometric Association, St. Louis, and Clark Equipment Co., Battle Creek, Mich.

surance rating which provides credit for good accident experience,—penalties for bad. Thus there is a direct incentive for foundrymen to operate safe plants.

An individual foundry's loss experience may be productive of such a high loss ratio (premium dollar paid vs. dollar losses paid out), that an insurance company may find it undesirable to insure

that risk. In addition, a continuation of such an abnormal loss ratio in a group of foundries can affect other foundries within the state having the same manual classification.

Obviously, then, the fewer number of losses, the better will be the experience or loss ratio. Since losses and dollars of premiums paid go into the Rating Bureau's

machinery for rate calculation, it is self-evident that insurance rates will decrease if losses are decreased. Some foundries are self-insured and their losses do not affect in any way the insurance rates fixed by the Rating Bureau,

nor does their loss experience affect any other foundries.

Accident prevention not only reduces costs but improves employee and public relations and increases operating efficiency. Furthermore, every employer has a moral obliga-

tion to his employees to do all in his power to prevent injury to them, and thereby prevent the consequences of injury—suffering of the family, disability of the injured, loss of earnings, prolonged inactivity due to loss of time, etc.

PLAN FOR SAFETY

It Doesn't Just Happen

Management must treat safety as an important part of production, and assume continuing administrative leadership in a sound safety program. Management must demand that everyone in a supervisory capacity assume an active interest in promoting safe practices. Safety consciousness must be instilled into every worker, by instruction as well as example on the part of the supervisory group.

This interest is demonstrated by:

- 1) Initiating a sound safety policy with procedures and personnel necessary to make it effective, and defining the responsibilities and authority of the individuals connected with the safety program.
- 2) Providing safe working conditions, safeguarding machinery and equipment, making available personal protective devices and apparel.
- 3) Developing an effective training program for supervisors and employees.
- 4) Encouraging employee interest and participation by making available channels through which employees may offer suggestions, advice and recommendations for the improvement of safety.

Employee Responsibility

It is the duty of employees to utilize machinery, equipment, tools, materials, the personal protective equipment and safeguards, in an intelligent and safe manner to the following end:

- 1) To protect themselves from being injured.
- 2) To work in an intelligent and safe manner in order to protect their fellow workers from harm.
- 3) To prevent damage to buildings and equipment.

Cooperation with the safety program is the moral obligation of each individual employee.

Starting a Plan

■ **Plant Safety Responsibility.** Every plant should have some person designated who will be responsible for the safety program. He is management's representative, and he should have top management's authorization to make plant safety inspections and recommendations regarding equipment and operating practices.

■ **Safety Inspection.** A regular system of plant safety inspections should be set up and used under the direction of the man responsible for the safety program. Safety inspections made in cooperation with department supervisors will stimulate good housekeeping and department operating efficiency.

■ **Safety Committees.** Safety committees composed of management and/or employees can be an excellent medium of promoting safe operating conditions. Such committees should hold regularly scheduled meetings, with the committee personnel being changed periodically for best results.

■ **Investigation of Accidents.** When an accident has occurred, those responsible for safety to management

should make an immediate investigation at the scene of the accident. No changes should be made in the conditions surrounding the accident until after the investigation, in order to determine all the essential causative facts. Such information should be properly used to prevent a recurrence of similar types of accidents in any part of the plant.

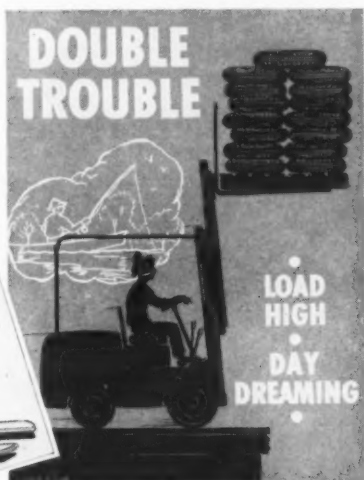
■ **Reporting of Accidents.** It is imperative that correct information be obtained in connection with accidents. Such information should include the injured's occupation, experience on the job, and length of service in present and previous employments. A clear description of how the accident occurred should be written. Sketches and photographs are an aid in this respect.

■ **Safeguards.** The safeguarding of all machinery, equipment, tools and processes should be carried out so that workers' safety will not be impaired. Safety should be considered in the purchase and design of all new equipment.

■ **Safety Instruction for Employees.** New or rehired employees or employees transferred from one job to another should be carefully and specifically instructed by the foreman with regard to safe practices in connection with the job to which they are assigned. The foreman on the specific job should also instruct his employees in the general plant safety rules.

■ **Safety Rules and Requirements.** A set of general safety rules should

STOP ACCIDENTS



Posters and warning signs act as effective reminders.

be developed for each plant. It is helpful to have these rules printed in a rule book.

■ **Safety Promotion.** Interest in safety can be promoted in many ways, such as by:

- 1) Personal instruction
- 2) Safety bulletins
- 3) Warning signs
- 4) Posters
- 5) Safety meetings
- 6) Contests
- 7) Awards
- 8) Incentive plans
- 9) Company magazine
- 10) Motion pictures
- 11) Demonstrations of safe and unsafe conditions or acts
- 12) Illustrations of the more serious results of actual accidents.

BUILD SAFETY INTO YOUR FOUNDRY

• The physical structure of a plant should be planned to prevent accidents that can result from narrow aisles, poor visibility, and other conditions that may endanger employees. New buildings should be designed with these problems in mind, but existing structures may readily be remodeled to correct the dangerous conditions detailed in this section.

Entrances

Entrances to heated buildings should be protected during cold weather by vestibules or enclosures which should be so constructed or located as to prevent harmful drafts from striking employees.

Vision Through Service Doors

All service doors and particularly the double-acting swinging-type doors should be provided with an opening not less than the equivalent of an 8 x 8-in. opening located at normal eye-level distance from the floor so that a view can be had beyond the door. If glass is used in this opening it should be of shatterproof or wire-reinforced.

Stair Railings

All fixed or permanent stairways open on one or both sides should be provided with substantial handrails and should have the open sides protected with standard guardrails and toeboards.

Floors, Pits and Galleries

■ **Condition of Floors.** A well-maintained foundry floor is necessary for efficiency and operating economy and is an important factor in the prevention of accidents.

All floors should be kept firm and level and should be cleaned and leveled frequently to provide and maintain safe working conditions.

■ **Melting Floors.** The floor beneath and immediately surrounding foundry melting units should be pitched away from the melting unit to provide drainage. The floor should be kept free from water in order to prevent an explosion hazard.

All pig molds or any receiving station for excess molten metal from ladles should be located clear

of any aisle or gangway and at least one foot above floor level.

■ **Floor Adjoining Tracks.** Where tram or standard gage railroad tracks run into or through foundries, it is generally found advisable to lower the rails so that the top level of the rails is the same as the established level for the foundry floor.

■ **Guarding Pits and Floor Openings.** All pits connected with ovens or furnaces and any floor opening should be protected at all times with either a protecting cover or standard guardrail when not in use.

■ **Galleries.** Galleries should always be equipped with standard handrails and toeboards and should be made accessible by good stairways. Ladders are unsatisfactory.

Gangways

■ **General Gangways.** Gangways other than those for carrying molten metal should be at least 3-ft wide and should be kept in good condition.

■ **Gangways Used for Handling Molten Metal.** Every gangway em-

ployed for the handling of molten metal should, during the progress of distribution and pouring of metal, be kept uniformly smooth, clear of obstructions, and free from pools of water.

Concrete pavements around pouring floors should be kept coated with sand during pouring operations, to reduce spattering of hot metal in case of a spill.

■ **Gangways Used for Parallel Molten Metal Operations.** Gangways in which truck or manually-operated monorail ladles travel parallel should be not less than twice the width required for one ladle operation.

■ **Gangways for Truck and Manually-operated Monorail Ladles.** Gangways where molten metal is distributed in trucks or manually-operated monorail ladles exclusively, should be not less than 24 in. wider than the extreme width of the ladle equipment.

■ **Gangways for Hand Shank Ladles and Crucibles.**

By Not More Than Two Men

Gangways where molten metal is distributed in hand shank ladles or crucibles which are carried by not more than two men should be not less than 36 in. wide.

By More Than Two Men

Gangways where molten metal is distributed in hand shank ladles or crucibles which are carried by



Clean, level foundry floors contribute to efficient manufacturing operations as well as being a major factor in eliminating accidents.

more than two men should be not less than 4 ft wide.

Aisles

■ **Condition of Aisles.** Every aisle

in which molten metal is being handled should be kept in good condition, clear of obstructions, firm, uniformly smooth and free from pools of water at all times.

HOT JOBS demand EXTRA CARE

● The use of mechanical devices for charging cupolas not only saves labor but also reduces material-handling accidents. Most of the foundry cupolas are now charged by either fully automatic charging machines equipped with crane and cone bottom buckets or by means of fork lift trucks equipped with tilting boxes.

Elevators used to hoist barrows or buggies from the ground to the charging floor should be effectively guarded and equipped with safety appliances as required for freight

elevators.

The space underneath any cupola charging elevators, machines, lift hoists, skip hoists and cranes should be railed off or guarded in order to prevent material dropping on workers below, during charging operations.

■ **Maintenance Work Inside Mechanically Charged Cupolas.** When ever maintenance or repair work is done inside mechanically charged cupolas, the mechanical charger should be locked out and warning signs posted indicating that work

is being done inside the cupola.

■ **Tuyeres.** On every cupola at least one tuyere should be of the safety type, provided with a small channel 1-1/2 or 2 in. below the normal tuyere level.

The channel of this safety tuyere is provided with an easily fusible plate that will melt through should the slag and iron rise to an unsafe level.

■ **Tapping.** When a cupola is tapped, the tap-out bar should never be held above the level of the tap hole, otherwise the bar might

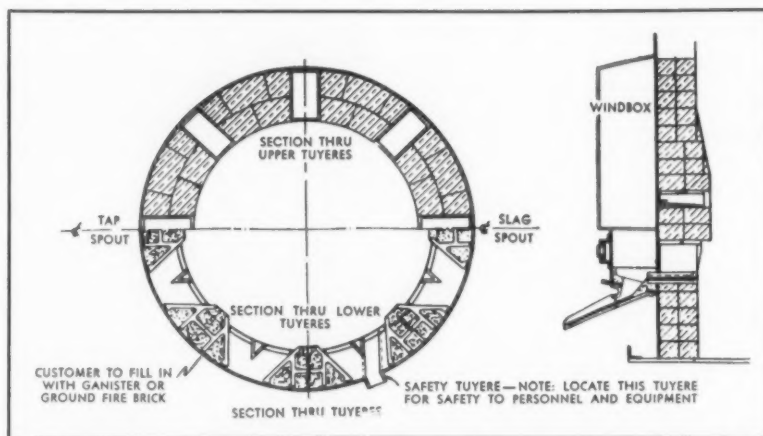
STOP ACCIDENTS

puncture the sand bed, causing a "runout" through the bottom.

When botting a tap hole, spattering of molten metal will occur if the bot is thrust directly in the metal stream. The bot should be brought immediately above the stream of metal close to the tap hole and aimed downward at a sharp angle.

■ **Dropping Bottom.** When the bottom is dropped by any method, no employee shall be allowed inside the danger zone unless protected by an enclosure or guard.

Dropping the bottom doors of a cupola requires extraordinary care. One of the best methods is to attach a block and tackle with a wire rope and chain leader to the props supporting the doors before starting up. When ready to drop the bottom, the props can then be pulled out by use of the block and tackle arrangement, which can be actuated from a safe distance or from behind a suitable barrier to insure that the person dropping the bottom will not be burned by the slag. Before the bottom is dropped a careful inspection should be made of the area underneath the cupola to see that no water



Section of cupola showing safety tuyere with fusible plate.

has seeped under the sand. A warning whistle or signal should be given.

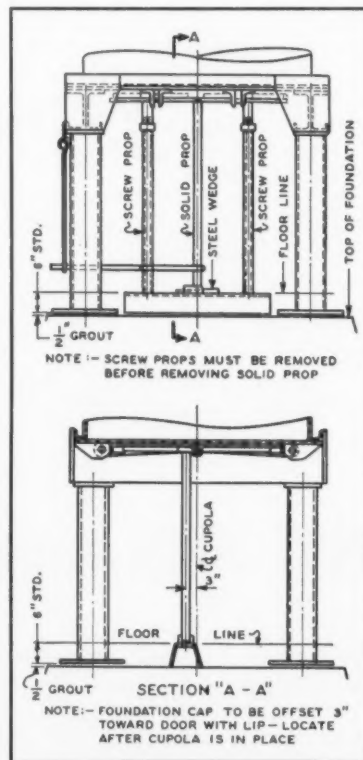
If the cupola bottom doors fail to drop for any reason or if the remaining charge inside the cupola bridges over, employees shall never be permitted to enter the danger zone to force the doors or relieve the bridging.

The doors may be opened and the bridging relieved by turning on the blast fan. The vibration produced usually corrects the condition. A mechanical vibrator attached to the bottom doors has also been found to be effective. Alternately, a heavy skull cracker may be dropped from the charging door.

If these methods fail to produce the desired result, then the doors must be flame-cut with a lance but only after the cupola is cooled to a safe temperature.

■ **Cupola Bottom Support.** The cupola bottom should be supported by at least two metal props of the required structural strength and by screws or wedges. The metal prop bases should be supported on a concrete footing or other fabricated footing of an equivalent strength. Props should be adjusted to the proper height by means of screws or wedges.

Temporary supports shall be placed under the cupola bottom doors to prevent their falling on any employee while the metal

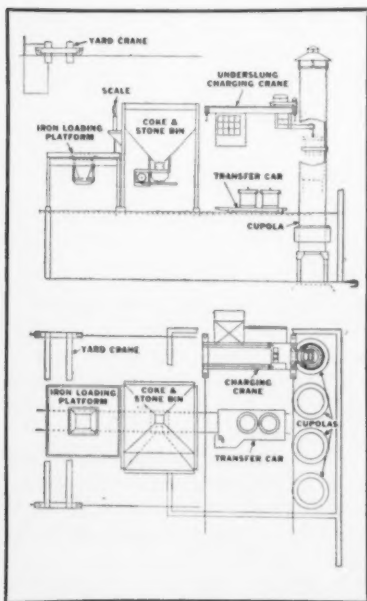


Cupola bottom doors need at least two metal props.

props are being adjusted to the proper height.

■ **Repairing Cupola Linings.** The following precautions should be taken:

A substantial screen or guard should be provided in the cupola



Underslung crane charging using cone bottom buckets.

and located above any men working therein to protect them against falling objects. Such screens or guards should be constructed of not less than 1-1/2 x 1-1/2 x 1/4-in. angle iron which is covered preferably with a screen, the equivalent in strength of a 1 in. mesh of 3/16-in. wire or not less than No. 12 U. S. gage solid sheet steel. Provision should be made for securely supporting such screens or guards by means of overhead slings or underpinning to resist any falling object.

All loose slag and bridges should be broken down and allowed to drop to the bottom of the cupola before beginning repairs on the cupola lining.

While men are working in cupolas, it is advisable to place warning signs or crossbars at the charging door to indicate their presence. If practical, the charging door should be locked at such times.

When the cupola is down for relining, the condition of the shell and riveting should be inspected. In relining, ample clearance (at least 3/4-in.) should be left between the brick lining and the cupola shell to allow for expansion, and this space should be filled with dry sand to serve as a cushion, protecting the shell against severe stresses.

Before starting up the cupola, the lining should be thoroughly dry and all tools and equipment should be removed.

■ **Ladle pits.** Ladle pits should be designed for removable receptacles into which slag may flow or be dumped.

Where pits are required for metal and slag ladles at melting equipment, such pits must be kept clean and absolutely dry and the bottom covered with dry sand. All such pits should have at least 1-ft clearance over the greatest overall di-

mension of the ladle and should have removable standard guardrails or cover plates to prevent workmen from falling into them when not in use. Such pits should be inspected daily.

Warning: Men should not be permitted in pits used for metal or slag ladles while metal or slag is being poured into the ladles.

■ **Scrap Breakers.** The breaking of castings or scrap by the use of a drop inside the foundry building during working hours should be prohibited unless such operations are performed within a permanent enclosure consisting of not less than 2-in. planking or equivalent protection. Such enclosures should be of sufficient height to protect employees who are working in the vicinity from injury by flying fragments of metal. When the ball is dropped by a rope, the rope should extend over pulleys to a point clear of the breaking area.

HANDLE MATERIALS without MANHANDLING MEN

● Material handling includes the lifting, loading, storing or movement of supplies and equipment either by hand or by mechanical means. The improper handling of material is a source of injury to personnel. Hernias, back strains, crushed toes, lacerations, and other injuries result from poor handling practices.

Manual Handling

The proper lifting, carrying and depositing of loads, and the correct use of hand trucks and other manual devices, should be understood and practiced by all personnel. Before lifting an object, the grasping surface should be free of oil, grease or other substances; and the footing should be secure. The object should be lifted with the body in a squatting position with the back straight and with the legs exerting most of the lifting force.

Hand protection should be worn when handling hazardous materials.

Mechanical Handling

Mechanical handling of material involving the use of lifting and hoisting devices such as cranes, etc., and special purpose vehicles and equipment should be done only by qualified and authorized personnel.

Mechanical equipment operators should be selected and trained in the safe operation of all equipment. Training should include inspection and a preventive maintenance of the equipment, and safe material-handling practices.

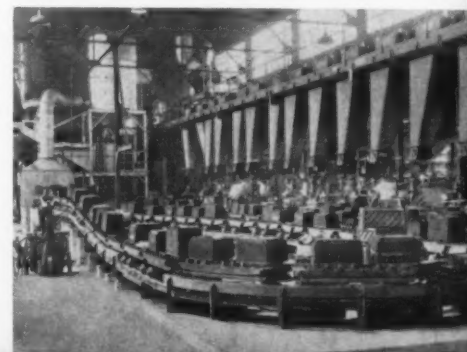
■ **Wheelbarrows and Hand Trucks.** Wheelbarrows should be pushed rather than pulled. Wheelbarrows and two-wheeled trucks should be equipped with knuckle guards. The steering handles of hand trucks should be kept in a vertical posi-

tion when the truck is stationary. This can often be done by equipping the tongues of flat trucks with counterweights, springs, or hooks to hold them vertical when not in use.

■ **Industrial Power Trucks.** Only trained operators, physically fit and authorized, may operate power trucks.

The center of gravity of the loads should be kept low by loading

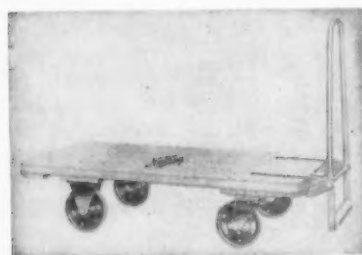
Materials in motion are source of many foundry safety problems.



STOP ACCIDENTS



Hand trucks and wheelbarrows should have knuckle guards.



Flat trucks with counterweighted tongues are safer.



Canopy guards on fork lift trucks may save broken heads.

heavier objects on the bottom and lighter objects on top. Side stakes should be used where objects may be easily dislodged. The overloading of all vehicles and trucks should be forbidden. The canopy guards should be provided on high lift trucks or any other equipment where there is danger to the operator from falling objects.

No riders may be permitted on equipment unless specifically authorized.

■ **Tilting and Reservoir Ladles.** Tilting types of ladles of not more

than 2000 lb capacity are used for 1) distributing molten metal, 2) mixing, 3) holding, and 4) slagging. If mounted on stationary supports or trucks, or handled by overhead crane or monorail, this type may be of the hand shank type and must be provided with a manually-operated safety lock. Such ladles may be also of the gear-operated type, equipped with a gear-operated safety lock or brake.

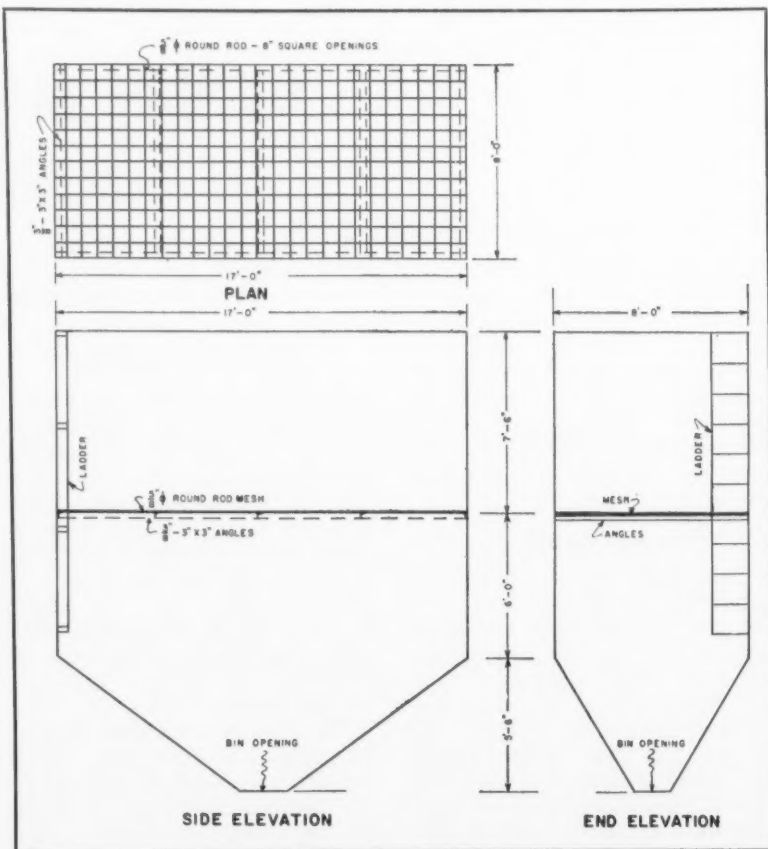
When such ladles are over 2000 lb capacity they should be of the gear-operated type, equipped with an automatic safety lock or brake in order to prevent overturning or uncontrolled swaying. If ladles are mechanically or electrically operated, an automatic safety lock or brake should be installed to prevent overturning.

■ **Trunnions.** Trunnions used on buckets, ladles, flasks and other

equipment to facilitate handling should be constructed with a factor of safety of at least ten (10) including the method of attachment to the equipment. The diameter of the head on the outside end of the trunnion shaft should not be less than 1.5 times the diameter of the trunnion shaft. When such trunnions are used with portable slings or hooks, there should be at least an over-all clearance of 1/4-in. between the inside of the trunnion base and the trunnion head.

■ **Floor Operated Hoists.** Air and electric hoists operated from the floor by means of pull chains, switches or valves, should always be equipped with easily recognized markers on the operating devices such as "hoist" and "lower," etc., or words to that effect.

■ **Swivel Load Carrying Hooks.** Swivel load carrying hooks on



Grates in hopper bins assure that the bins hold sand, not bodies.

many types of hoisting equipment are attached to a shank or bolt by means of a threaded nut. If the action of the swiveling hook might cause the nut to turn, the nut should be locked in place.

■ **Crane Track Wheel Bumpers.** All overhead and gantry crane tracks shall be equipped with track wheel bumpers that will prevent the crane from running off the crane runway or striking the building structure. Such bumpers must be accurately located so that the crane can be realigned from them on the runway.

■ **Crane Cabs.** Crane-cab operators should be protected from the outdoor elements or from heat if handling molten metal. Safe access to the cab, such as by platforms, catwalks and the like, should be provided.

Crane trolley wires supplying power should be so guarded that

the crane-cab operator cannot have any physical contact with them.

■ **Chain Conveyor.** When chain conveyors operate at various levels, other than in a fixed horizontal plane, a mechanism of safety dogs that will hold the chain and prevent the loaded chain from piling up at the bottom of the incline in case of chain failure should be installed on the upgrade and downgrade inclines.

■ **Elevator Openings.** All elevator openings should be protected by elevator gates, which are either manually or mechanically operated. The gates should be at least 6-ft high.

■ **Gate Interlocks.** All elevators should either be electrically or mechanically interlocked with the elevator platform so that it is impossible to start the elevator until the gate is in a closed position, or to open the gate until the elevator

is at the floor level.

■ **Safety Blocks.** All elevators other than hydraulic elevators should be equipped with safety blocks operated by a speed-governor control.

■ **Hatch Limit Switches.** All types of elevators should be equipped with upper and lower travel limit devices.

Storage Bins

Hopper bins containing material which is fed out at the bottom of the bin either by hand or by mechanical means should be covered with a grating which will allow the use of pokers to break up bridging of the stored material but will not permit a workman to enter the bin. When it is necessary to enter the bin, safety belts and lines should be worn and one or more assistants should be on duty to attend the safety lines.

FLYING CHIPS in the Finishing Dept. are DEADLY MISSILES

Where castings are cleaned or chipped on the floor, screens or partitions should be provided in order to protect other employees from flying chips. Where castings are cleaned or chipped on finishing rails or benches, the space between the rails or benches should be wide enough to allow the operator to pass between them without being endangered by falling objects.

■ **Grinding, Polishing and Buffing.** All grinding wheels, except the cup, cylinder, inserted nut, mounted, plate mounted or the threaded type, should be provided with flanges in order to retain the pieces of the wheel should it break in operation. Flanges may be of the hub, ring or tapered type. Gaskets or blotters between the wheel and the flange should be provided.

Before being placed in use, grind-

ing wheels should be tested for cracks by tapping them gently (while suspended), with a wooden mallet. Unless they have a clear bell-tone sound they should not be used. Wheels must be dry and free of sawdust in which they are packed or the test will give false results.

Grinding wheels should never be operated at speeds in excess of manufacturer's rating of maximum safe operating speed.

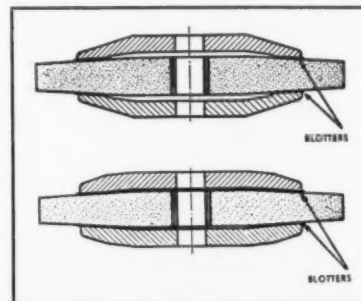
All horizontal spindle grinders should be provided with substantial work rests and the space between the grinding wheel and the work rest should be such that all or any part of the work cannot become caught in such space.

Grinding, polishing and buffing equipment of any type should not be left in operation unattended.

■ **Tumbling Mills.** All tumbling

mills not provided with a complete enclosure should be provided with a suitable guard affording complete protection from the exposed parts of the mill when operating.

All tumbling mills should be equipped with a positive locking device to prevent the mill from turning during loading and unload-



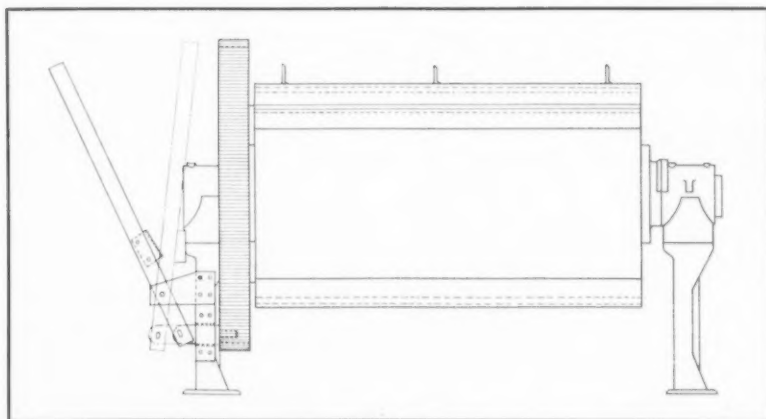
Blotter between grinding wheel and flange aids safety.

STOP ACCIDENTS

ing. Such device must prevent turning due to unbalancing of the load within the mill, unintentional turning on of power or any other cause.

■ **Magnesium Grinding.** The fundamental explosion hazard in connection with the grinding of magnesium lies in the dust collection system.

A system considered safe for the collection of magnesium grinding dust is one in which the dust from the grinder is precipitated by a spray of water. A heavy flow of water is used, and the precipitated dust is immediately washed into a sludge pit.



Tumbling mill with locking device will not turn out of turn.

STOP BLOODSHED with PERSONAL PROTECTIVE DEVICES

■ **Foot Protection.** All persons handling heavy objects should wear proper shoes with protective toe boxes or foot guards. Persons who handle molten metal or do shake-out operations involving hot sand should wear leggings or spats for the protection of legs and feet.

■ **Clothing for Handling Molten Metal.** When molten metal is being handled, as much of the body as possible should be covered by normal type clothing. Clothing that is resistant to burning is advisable. Such clothing should fit closely at

the neck and waist, and sleeves should not be rolled up.

■ **Clothing for Abrasive Cleaning Operations.** In abrasive blasting operations all portions of the body shall be protected from abrasives. In hydraulic blasting or in cleaning operations, ventilated and waterproof clothing shall be worn.

■ **Protection of Eyes Against Flying Objects.** All employees who are exposed to eye injuries from dust, flying chips or fragments, molten metal and other material, should wear spectacles or cup type

goggles properly fitted to their head, equipped with safety lenses or the equivalent protective devices.

■ **Furnace Operators' Eye Protection.** All operators and helpers on electric melting furnaces and on any other type of furnaces that create an intense glare should wear eye protectors with suitable filter lenses.

■ **Head Protection.** Where hazards from falling materials exist, as in cupola repair work, suitable head protection should be worn.

EVEN ACROBATS SOMETIMES FALL

⚠ All fixed ladders (except for a stack, water tower or tank) more than 25-ft high, should be provided with a cage or basket type guard which will prevent a person from falling backward through the guard. Such guards shall be free of inside projections and flared outward at the bottom not less than 4 in. This guard shall extend from the top of the ladder

to within at least 8 ft of the bottom of the ladder.

Portable Ladders

All portable ladders, excepting stepladders, shall be equipped with safety shoes to prevent ladder slippage. No such ladders should be used at an angle of more than 22° with the vertical. This is approximately equivalent to a distance of

1/4 of the length of the ladder from its base to the vertical. Lashing of ladders is considered good safety practice.

Portable metal ladders should not be used where electrical hazards are present.

A ladder should never be placed on a box or barrel as a makeshift attempt for securing additional height.

Portable wooden ladders may be coated with a clear varnish or linseed oil.

Railing Construction

Standard railings shall be 3 ft 6 in. in height, with a rail midway between the top rail and the floor or working level.

Posts shall not be more than 8 ft apart. If made of pipe, the pipe shall be 1-1/4 in. inside diameter

or larger. If made of metal shapes or bars, the section shall be equal in strength to that of 1-1/2 x 1-1/2 x 3/16-in. angles. If made of wood, the post shall be 2 x 4 in. or larger. The top rail, if wooden, shall be 2 x 4 in. or two 1 x 4 in. strips, one on top and one at the side of the post.

The center horizontal rail, if made of wood, may be 1 x 4 in. or more and should always be straight

grained and free from defects.

Where panels are fitted with expanded metal, wire mesh, or perforated metal, the center horizontal rail may be omitted.

Toeboard Construction

Standard toeboards shall be made of wood, metal, or other substantial material, or of metal grill not exceeding 1-in. mesh and shall have no less than 4 in. height.

DON'T BE SHOCKED by ELECTRICITY

To assure utmost safety in the installation of new electrical equipment, only those employees qualified as to experience and general knowledge of the job should be assigned to such work.

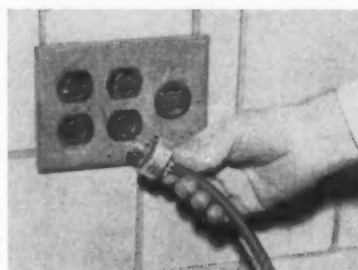
Generators, motors, control equipment and conductors shall be installed in such manner that exposed parts are properly guarded or insulated to provide adequate protection. Only totally enclosed motors should be installed in the foundry.

Control equipment such as switches, contactors, circuit breakers, etc., should be installed in such manner that there will be sufficient room to make them readily accessible for inspection, repairs or replacements.

All circuits shall be permanently marked or lettered on the switch box or control equipment so that they may be readily identified. To guard against accidental injuries arising from ignorance of hazardous conditions such as high-voltage lines or current-carrying parts, signs adequate as to hazard identification and easy visibility should be prominently displayed.

Built-in Grounding

One method of grounding equipment utilizes three-conductor cord (four conductor on three-phase circuits) with a multi-contact polarized plug-in receptacle. With this method, automatic grounding is assured as one wire forms a contin-



Built-in grounding provides for safer use of electricity.

uous path from the equipment through the receptacle to the ground. This method of grounding can be used only where polarized receptacles have been installed.

Extension Lamps

Ungrounded brass shell sockets should never be used with extension lamps. Sockets made of porcelain, composition or a rubber covering are recommended.

Operation of Electrical Equipment

Control switches shall not be tampered with and made inoperative. A thorough check should be made by workman to determine all the hazards present and to see that all necessary safeguards are provided to protect himself, other workmen, and apparatus.

Safeguards such as danger signs, roped-off space, etc., for persons close to but not engaged in the particular work should be provided.

Unexpected starting or movements of electrical equipment that can be actuated by remote control may cause injuries to personnel near enough to be struck.

This unexpected starting of motors may injure men working on them as well as men operating machines controlled by the motors. Because of this possibility, whenever it is necessary to make repairs on motors or electrical equipment, the circuit should be opened at the switch box. The switch should be padlocked in the open position and a work description tag affixed, including the name of the man performing the repair work.



Locked-out switches rarely kill maintenance workers.

DANGER LURKS in the CORE ROOM and on the MOLDING FLOOR

☛ Safety must be practiced in every department of every plant if the castings industry is to improve its record. Here are recommendations for the core room and molding department.

Sand Mullers

No one under any circumstances should enter into the muller tub or mixing chamber without first having locked out the disconnect switch controlling the muller. Various techniques of locking out may be employed but it is recommended that each employee use his personal padlock to lock out the disconnect switch. Sand mullers should also be vented and openings to the muller mixing tanks should be enclosed and guarded sufficiently to keep personnel away.

Where automatic air cylinder dumping buckets are used, controls should be so placed that the operator is away from the dumping area and therefore cannot be pinned between the muller and the bucket or under the bucket as it is lowered. If cable-type skip-hoist buckets are used in conjunction with the mullers, the operating controls should be located away from the buckets.

Sand Belts

There should be at least two

stop buttons located on each belt and pulley assembly, one at each end, and intermediate stop buttons as necessary. Head and tail pulleys should be completely guarded.

Sand Elevators

Elevator shafts should be kept in good condition, with no unnecessary openings. Openings which are essential should always be well guarded.

Core Blowing Machines

If practical, two-hand operating controls should be provided so as to prevent the operator from placing his hand or fingers between the top of core box and the ram.

In order to prevent sand blows which can injure operators or other personnel, parting lines should be maintained in good condition. Sand blows can be prevented by the use of dike seals.

Transporting Cores

If belts are used, they should be surveyed for the usual danger points and guarded. If cores are moved by truck, shelf-type racks are normally used. The legs of these racks should be kept in good condition.

Core Processing Line

Conveyors used on processing lines should be well guarded and employees must be watched so that they do not store materials under these conveyors. Employees should never be allowed to ride these conveyors or to cross except at designated crossovers.

Sand Systems

Where pug mills are present in a sand system, they should be completely enclosed and disconnect switch should be padlocked out when covers are removed.

Elevators

Elevators should be completely

enclosed or the necessary openings well guarded. No employee should ever be allowed in an elevator under any circumstances. If a plug-up occurs, and sand must be shoveled from the bottom of the elevator, the electrical disconnect switch, which should be located at basement level, must be padlocked out.

Mold Conveyors

Where clearance between the mold conveyor and any fixed or portable object is less than 18 in. space or clearance shall be blocked to prevent passage of personnel.

All mold conveyor car wheels should be completely guarded. Mold conveyor car tops should have metal sections mounted between them in order to eliminate pinch points and discourage passage between cars.

Clamping Operations

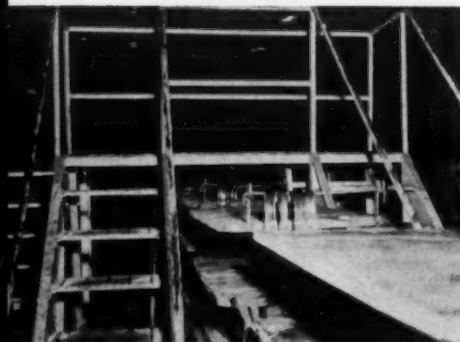
Clamp-up men should make sure they do not clamp scrap molds so that iron pourers will not accidentally pour a mold lacking a required core.

Care should be taken throughout molding, clamp-up and pouring operations, that scrap molds without cores are not poured. If these molds are filled with hot iron, they do not get a chance to solidify before they reach the cope removal station and the resulting runoff can cause serious injury.

Molding Machines

All molding machines should be equipped with two hand controls for the molder and also for the molder's helper when a helper is needed.

Automatic machines which go through a complete cycle without an operator should be so guarded that passing employees cannot be injured. The method of operation should be such that the molder will not be near the machine as it goes through the molding cycle.



Crossovers are the safe way.

The problems of mold wall movement and effects on "apparent shrinkage" in gray cast iron have been recognized and reported in the literature. Investigations on this subject have been primarily concerned with the influence of mold wall movement on gray iron castings because their high pouring temperature and mushy mode of solidification produce large effects on final dimensions. The high pouring temperature produces considerable thermal expansion in the sand mold wall. The mushy solidification mechanism results in gray iron following any mold wall movement throughout solidification.

The effect of this phenomenon is demonstrated in Fig. 1 which is a schematic representation of the formation of a shrinkage cavity under two conditions. The top sketch indicates a bar with sufficient riser to be cast sound in a mold that does not enlarge. The lower sketch shows how considerable mold wall dilation will drain the riser and produce a dimensionally oversize casting with a shrinkage cavity.

This progress report is concerned with a review of the published information on the cause of this expansion, the influence of various mold constituents, and the effect on the mold cavity. The work was

R_x FOR SWOLLEN GRAY IRON CASTINGS

Doctor your sand with additives that will control mold wall movement

undertaken as a part of the review of gating and risering of gray cast iron sponsored at Case Institute of Technology by the Gray Iron Research Committee of the American Foundrymen's Society.

Green Sand Movement

The initial work of Womochel and Sigerfoos (1) clearly demonstrated that considerably greater mold wall movement was experienced in green sand than in dried sand molds or baked core sand molds. This has been confirmed by Gittus (2) and others. The cause of this behavior has been rationalized by Gittus. His results, shown in Fig. 2, indicate a green sand mold undergoes an initial expansion as molten metal enters the mold.

This outward expansion is produced by the heated inside surface

of the mold expanding into and compressing a high moisture layer immediately back of this heated layer. The compression and resulting mold cavity expansion continues until a sand layer of sufficient thickness and strength to resist outward expansion has been dried by the molten metal. When this dried skin is sufficiently strong, an inward expansion occurs for a period of time until the overall sand mold becomes heated and expands away from the mold center.

A dry (or baked core) sand mold, however, does not form this weak, compressible, high moisture layer because of the absence of water. It expands inwardly as soon as heated by the metal. The inward expansion continues until the overall sand mold is heated sufficiently to produce a general outward expansion.

J. F. WALLACE/
Associate Professor



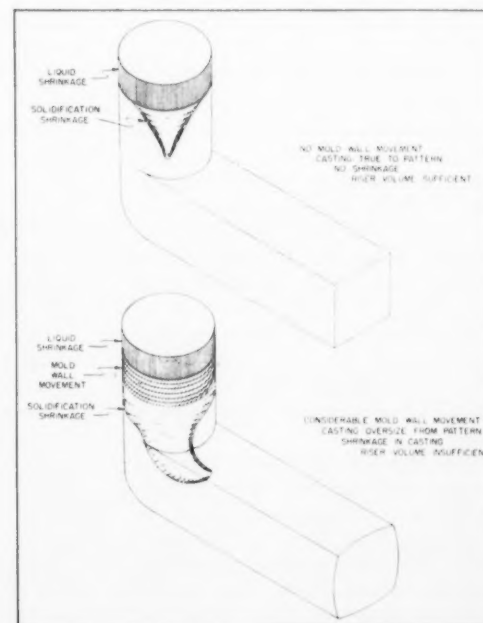
E. B. EVANS / Research Associate
Case Institute of Technology

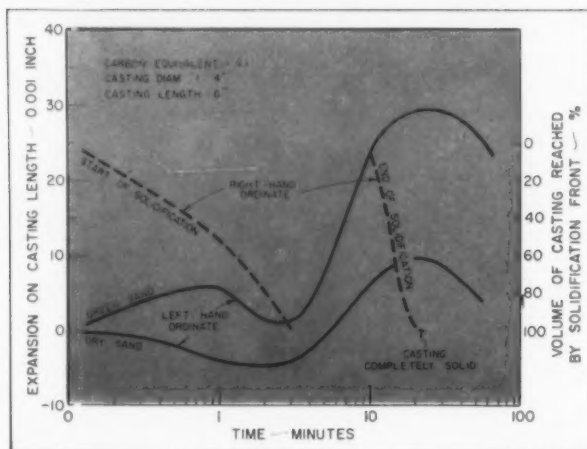
This explains why a mold cavity may be considerably larger in green sand than dry sand. Since gray iron follows the mold wall until solidification is completed, a large casting is produced as demonstrated in Fig. 2. Schmidt, Sullivan and Taylor (3) report volumetric expansions of about 2 1/2 per cent in green sand and only 3/4 per cent in dry sand molds between the liquidus temperature and complete

HOW TO REDUCE OR ELIMINATE CASTING DILATION

What to do	Why does this work?	Where to learn more (numbers refer to bibliography at end of article)
Lower moisture content	Sand less easily deformed	1, 2, 3, 9
Skin dry the mold	Sand less easily deformed	2, 14
Ram harder, increase sand flowability, improve sand grain distribution	Sand less easily deformed	1, 7, 12, 15, 16, 17
Add seacoal or other carbonaceous material	1) Heat is removed faster and casting freezes quicker 2) Sand expands due to coking of seacoal	1, 7, 8, 15
Add wood flour or other cellulose binders	Same as above	7, 9, 15
Lower clay content	More refractory mold with less shrinkage from hot metal	7, 8, 15
Use more refractory molding material such as zircon	Greater heat conductivity gives slight chilling effect	7
Lower graphitic carbon content in the iron	Metal will have less tendency to follow mold wall throughout solidification and there will be less eutectic expansion against the mold wall	1, 2, 14
Pour at higher temperature in presence of seacoal	Greater coking and expansion of seacoal	7
Pour at lower temperature in absence of seacoal	Lower mold temperature	7

Fig. 1 . . not enough iron to feed the casting is the usual result of mold wall movement. Schematic compares a sound and an unsound casting to show the movement.





solidification in an 8 in.-long, 3-3/4 in.-diameter cylinder.

As an extreme example, Heine and Rosenthal (4) cite an intended 260 pound casting which actually weighed 320 pounds. This indicates that a volumetric expansion of about 20 per cent can be obtained under very poor conditions. Gittus also presents data to show that casting dilation is produced by thermal expansion of sand, not by pressure exerted on the mold wall by liquid metal. Although the sand mold wall expands similarly in a steel casting, little difference in casting dimensions is observed between green and dry sand molding because steel solidifies by first forming a solid skin which does not follow the mold wall as it expands away from metal. (5, 6).

Molding Sand Influences

The number of variables which influence this mold wall movement are numerous. A list of factors that reduce expansion of mold cavity and reasons for the reduction in expansion are given in Table 1. It appears that wall movement in green sand molds is reduced by any factor reducing moisture or clay content of sand, lowering temperature of the sand mold skin, increasing solidification rate of the iron, or producing an expansion of sand.

The type of clay bond employed exerts considerable influence on mold wall movement. Southern bentonite is reported (7, 8) to produce less mold wall dilation than western bentonite; the results with fireclay, however, are somewhat

contradictory. The reduced mold wall movement experienced with southern bentonite appears to be associated with the fact that this bond undergoes less shrinkage when dried.

The conflicting reports on fireclay bonded green sands may arise because higher percentages of fireclay and water are required to obtain equal green strength than for bentonites, although equal amounts of fireclay shrink less than either type of bentonite when dried.

Effects of both moisture and seacoal on mold dilation are very definite according to several investigators. Increasing additions of water to natural molding sand containing 1 per cent pelleted pitch produces a proportional increase in mold dilation as shown in Fig. 3. Gradual reduction in mold expansion produced by increasing additions of seacoal to a 6 per cent southern bentonite-bonded green molding sand is demonstrated in Fig. 4.

Graphitic Carbon Influence

Graphitic carbon in gray iron increases the amount of mold wall movement because of the more mushy type of solidification. Increased eutectic expansion force against the mold wall also brings about a greater tendency to follow the mold wall. The amount of this expansion has been plotted (9) in Fig. 5 to show the quantitative effect of increasing graphitic carbon content on total expansion.

While this expansion influences over-all dimensions of the casting, no increase (in fact a decrease)

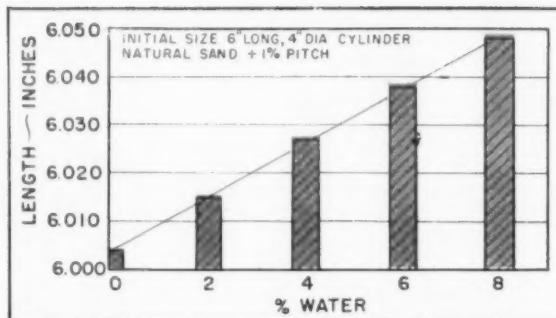


Fig. 3 . . More water, more expansion. Added water increases mold dilation proportionally.

Fig. 2 . . Difference in expansion of green and dry sand shows that larger molds may be made in dry sand.

in shrinkage cavity or riser requirements occurs with increasing graphitic carbon content because of the large expansion of the solidifying graphite.

However, this effect of graphitic carbon should be considered because it does result in a casting of greater size. This graphitic expansion would compensate for considerably more shrinkage cavities from other sources such as liquid contraction, if the mold wall movement phenomenon did not occur. Gray iron foundrymen frequently rely on this graphitic expansion for reduc-

ing shrinkage cavities from other sources.

Calculating Volume Changes

Operating foundrymen are directly interested in how much volumetric expansion is to be anticipated under a given set of conditions so that proper allowance can be made.

This expansion may be calculated by following the instructions contained in the box on next page. Certain simplifying assumptions were made:

1) The effect of amount of moisture and seacoal in the molding sand and of graphitic carbon in the iron are independent of one another.

2) The mold moves an equal distance on each surface.

3) The volumetric expansion or contraction is inversely proportional to ratio of surface area to volume of the casting.

4) The changes in volume are relatively small and follow the same general type of variation exhibited by the linear expansion or contraction.

Control Mold Wall Movement

Control of dimensions and elimination of shrinkage cavities can be accomplished by minimizing mold

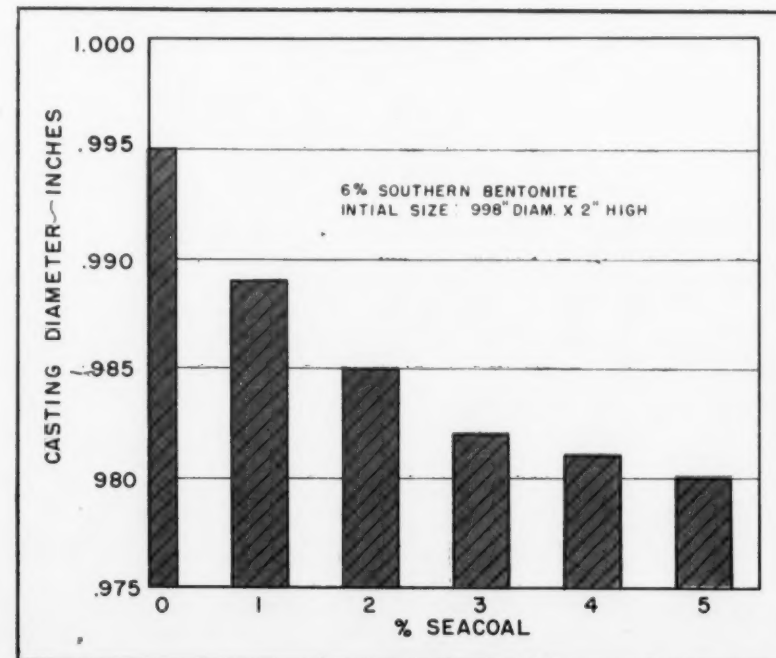


Fig. 4 . . More seacoal, less expansion. Increasing additions of seacoal produce a gradual reduction in the expansion of the mold.

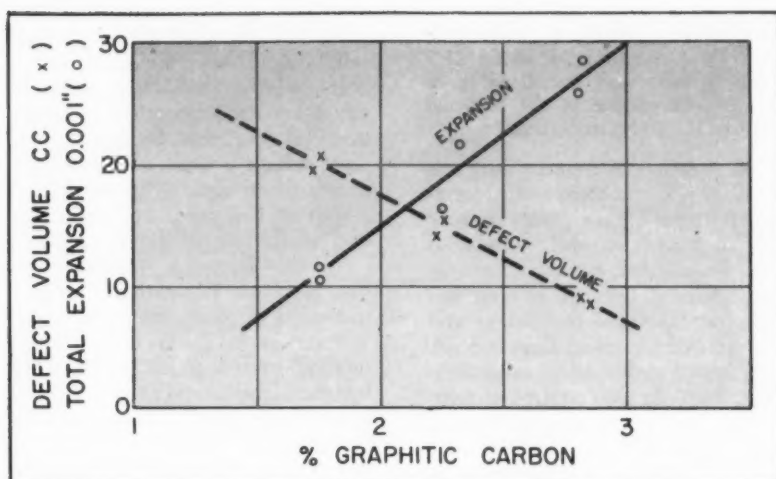


Fig. 5 . . If the graphitic carbon content of the iron is increased, the mold wall will move without increasing the shrinkage cavity.

wall movement as much as feasible. This requires standardization and control of the variables listed in Table 1 within limits that assure small mold wall dilation. Variables involved include sand, metal, and methods and hardness of ramming (11, 12, 13, 17).

Mold wall movement is not a serious problem in dry sand or baked core sand molds and is practically non-existent in sodium silicate CO₂-gassed molds (18). Thermal expansion of internal cores is undoubtedly influenced in a similar manner. Expansion of baked sand cores is often sufficient to permit considerable reduction in rising requirements of castings. Similar behavior would be expected with dry sand and CO₂-gassed cores but less expansion would be anticipated from green sand cores.

■ The test described above can be used to determine the amount of mold wall movement experienced under actual foundry conditions.

■ The equations developed can be employed, within the accuracy of assumptions used, to predict the effect of variations in moisture and seacoal in the sand and graphitic carbon in the metal.

■ Deliberate variation in these factors to reduce mold wall movement, however, is hazardous in many cases because of their effect on other important casting conditions.

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* now MODERN CASTINGS

How Does Your Casting Grow? Calculate It!

■ The volume change that will occur in a casting can be predicted by a rapid calculation developed by authors Wallace and Evans from numerous observations.

The first step is to determine a constant which represents the influence of the sand mix and other variable conditions in the process of the individual foundry. To obtain this constant, first determine the per cent change in volume of a representative casting. The per cent change in volume is the difference in weight of the casting as made in green and dry sand molds divided by the weight of the dry sand molded casting, multiplied by 100.

Observed per cent change in volume (V) may be substituted in the following equation to determine the constant (D for cylinders, D' for bars and plates) that will correct for the variation in an individual foundry.

For cylinders:

$$D = \frac{V - (d \cdot l) (0.25 W - 1.1 \sqrt{S})}{21 + d} - 1.3 C$$

For bars and plates:

$$D' = \frac{V - (l \cdot w \cdot t) (0.25 W - 1.1 \sqrt{S})}{lw + lt + wt} - 1.3 C$$

Where

V = per cent in volume of given casting

d = diameter, in.

l = length, in.

w = width, in.

t = thickness, in.

W = per cent water in sand

S = per cent seacoal in sand

C = per cent graphitic carbon in casting.

The upper and lower limits of casting size not known.

When the constant has been determined, it may be used to predict the change in volume whenever a casting is made in the sand upon which the constant is based. The constant is used in the following equation to determine the volume change:

For cylinders:

$$V = \frac{d \cdot l (0.25 W - 1.1 \sqrt{S})}{21 + d} + 1.3 C + D$$

For bars and plates:

$$V = \frac{l \cdot w \cdot t (0.25 W - 1.1 \sqrt{S})}{lw + lt + wt} + 1.3 C + D'$$

Where

V = per cent in volume of given casting

d = diameter, in.

l = length, in.

w = width, in.

t = thickness, in.

W = per cent water in sand

S = per cent seacoal in sand

C = per cent graphitic carbon in casting.

D or D' = Constants that correct for factors inherent to sand mix and other foundry variables.

The upper and lower limits of casting size not known.

HOW TO AVOID SAND SEGREGATION

Scrap castings can result from the strange activity of moving sand



This article is based on work done jointly by Committee 8-F of the AFS Sand Division and the Grading & Fineness Committee of the National Industrial Sand Association.

Segregation of foundry sands is not a new problem with foundrymen. It has been a constant problem in foundries and with sand producers. It has, however, become more evident because of vast improvements in sand technology and a greater emphasis on sand control. This added emphasis on sand technology and quality control of castings has led to a greater realization of the importance of sand distribution and grading in foundry operations. Sand segregation problems become more important since variation in grain distribution ultimately leads to variation in casting quality.

The Joint Committee undertook the study of sand segregation to learn where segregation asserts itself to the greatest extent and to investigate possible means of reducing it to a minimum.

Sand segregates every time it is moved from one place to another regardless of the method of trans-

portation. Whether it be by truck, rail, wheelbarrow, screw conveyor, belt conveyor, bucket elevators or any other known method, segregation takes place. Segregation is most extensive when sand is placed in storage or removed from storage—both at the point of production and at the point of consumption.

W. D. Chadwick, Manley Sand Co., Rockton, Ill., gathered experimental data to demonstrate segregation and indicate one possible method for its control. The work involved the study of a dry sand being loaded and unloaded from a storage silo. The sieve analysis of the sand is shown in the column headed "Basic Test," Table 1.

For the purposes of visually demonstrating segregation the base sand was divided into three fractions: that which was retained on a U. S. Series Sieve No. 40 and coarser was dyed red; from 50 to 100, no dye; and 140 and finer, dyed blue. The three sand fractions were thoroughly mixed and loaded into the experimental square silo made of plate glass with a plexi-glass bottom.

Four experiments were run, with the sand being loaded as indicated in the sketches and subsequently withdrawn as indicated. The "X" indicates the point at which the sand was loaded into the top of the silo and the "O" indicates the discharge point on the bottom.

In experiment "1" the sand was introduced at the center of the top of the silo through a 1-in. diameter opening. The sand was discharged from the bottom of the bin through sixteen 3/8-in. diameter openings.

In each of the other three experiments, the sand was introduced through 1-in. diameter inlets and discharged through 1-in. diameter outlets as shown in "2," "3," and "4," of the sketches.

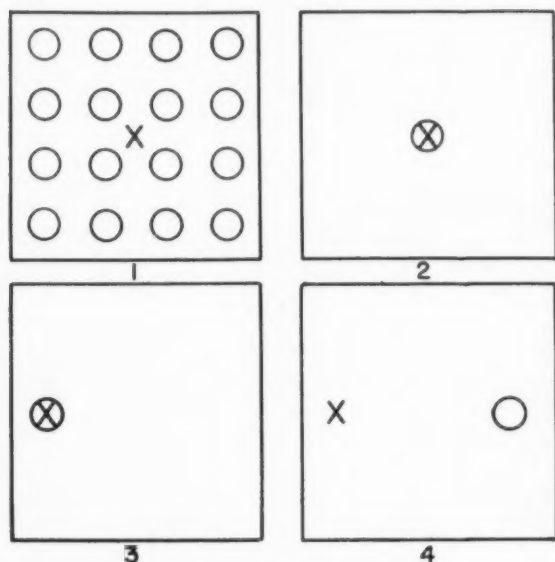
Colored motion pictures were taken while the silo was being emptied and the dyed sand showed clearly the segregation which takes place when dry sand is handled in each of the four ways.

The segregation of sand particles always occurs in the same manner. The coarsest particles always roll to the outside and the finer parti-

FACTS ABOUT SAND

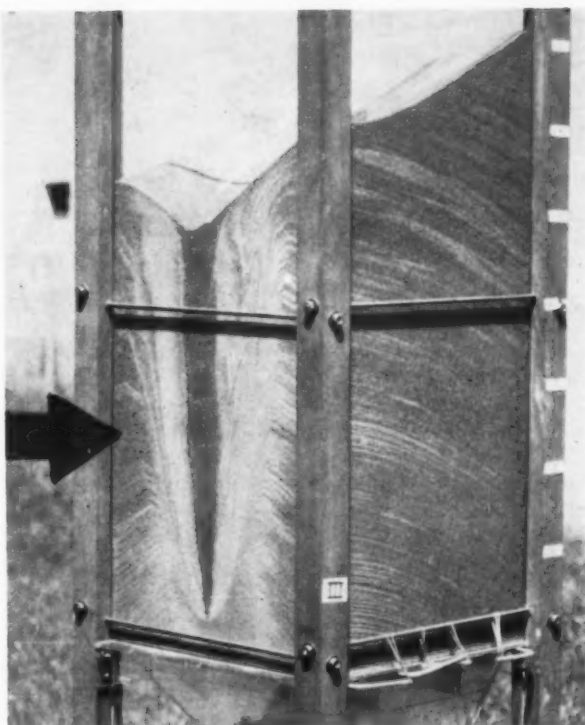
- 1) Sands of high clay content will segregate less than those which are nearly or entirely clay free.
- 2) Dry sands show a much greater tendency toward segregation than damp sands.
- 3) Sands of wide grain-size distribution will segregate more than those of narrow distribution. This in no way condemns the use of broadly distributed sands but rather is intended to point out where segregation occurs to the greatest extent.
- 4) Sand tends to segregate every time it is handled.

Going in and coming out of storage, sand is most vulnerable to segregation. Researchers used this top-loading, bottom-unloading apparatus to probe secrets of sand segregation.



"X" marks the spot where sand was loaded, circles indicate relative location of the discharge from the bin for each loading.

Thoroughly mixed before loading, this sand segregated after several samples were drawn from the bin.



cles remain in the center.

A complete sieve analysis for the first and fourth test is shown in Tables 1 and 2. The numbers at the heads of the columns locate the point at which the sand, (top level of the sand) was located at

the time each sample was taken. The white marks on right-hand silo brace in Fig. 1 are numbered from 0 to 9, starting at the top. Marks are 6-in. apart.

In the four test runs the same well-mixed sand sample with an

TABLE 1. RESULTS OF TEST NO. 1

Screen	Basic Test	1	2	3	4	5	6	7	8	9
On 20	1.0	.7	1.0	.9	1.2	.9	1.0	1.0	1.0	1.0
30	11.4	11.4	10.7	10.7	12.3	11.5	12.5	12.6	10.3	10.3
40	14.3	15.2	13.9	13.7	15.6	14.4	15.9	15.1	12.1	12.5
50	11.4	11.3	11.1	10.5	11.0	10.0	10.6	10.0	13.2	15.3
70	14.9	14.8	14.5	15.1	15.0	14.3	13.8	13.9	15.2	17.4
100	14.9	14.9	15.4	15.9	15.8	14.2	13.6	13.0	15.6	15.7
140	18.5	17.7	19.0	19.0	17.7	19.4	18.9	18.9	19.0	17.0
200	9.5	9.6	10.3	9.7	8.5	10.3	10.1	10.5	9.7	7.4
270	3.5	3.8	3.4	3.9	2.4	4.3	3.1	4.3	3.3	2.9
Pan	.6	.6	.7	.6	.5	.7	.5	.7	.6	.5
AFS No.	69.71	69.80	71.60	70.40	66.19	72.32	68.77	72.00	70.57	66.38

TABLE 2. RESULTS OF TEST NO. 4

Screen	Basic Test	0	¼	½	1	2	3	4	5	6	7	8
On 20	1.0	1.6	1.6	1.7	1.6	.5	.7	1.1	1.0	1.1	.7	1.7
30	11.4	17.1	15.2	15.5	15.7	7.0	8.6	12.5	12.2	13.6	9.7	18.3
40	14.3	19.4	18.7	17.4	17.5	9.4	11.6	14.5	15.4	15.9	14.4	18.7
50	11.4	14.5	15.0	13.8	13.3	10.2	11.4	11.5	12.6	11.7	12.8	11.9
70	14.9	17.7	16.8	17.7	14.9	15.0	14.5	14.8	14.8	14.4	15.9	13.8
100	14.9	13.5	14.2	14.6	14.3	16.4	15.9	14.0	13.7	13.7	15.1	11.8
140	18.5	11.8	13.7	13.9	15.3	22.3	20.8	17.5	17.5	17.3	18.4	13.9
200	9.5	3.7	4.2	4.7	6.1	12.3	11.7	9.3	9.1	8.7	9.6	7.0
270	3.5	.6	.6	.7	1.2	5.9	4.0	4.1	3.1	3.2	2.9	2.6
Pan	.6	.1	.7	.7	.1	1.0	.8	.7	.6	.4	.5	.3
AFS No.	69.71	51.98	53.93	54.96	57.87	81.65	75.79	69.58	67.43	66.15	69.11	59.16

Unloading and Conveying

The following recommendations are offered to producers and consumers as methods of further minimizing segregation.

UNLOADING

Wheelbarrows, endloaders, and grab buckets: When unloading sand from cars, work across the car, perpendicular to the track in order to get as complete a cross section of the sand in the car as possible. This will assist in reblending the sand and counteracting segregation as it is placed into storage.

Bottom dump equipment: Segregation is nearly impossible to control at the point of discharge and reblending must be accomplished from this point on to storage.

CONVEYING AND STORING

Belts: Distance of fall onto the belt and from the belt should be as short as possible. Wider belts running at slower speeds are better than narrow belts at high speeds for reducing peaking of sand on the belt. The use of baffles and cones at the point of discharge help distribute sand uniformly throughout the storage area.

Bucket elevators: The use of baffles at the discharge point is important.

Pneumatic conveying: Information on this method is too limited at this time to make any recommendations.

Gravity flow: Baffles should be used to retard the speed of sand flow and minimize the distance of free-fall.

Screw conveyors: Segregation is kept to a minimum with this method of conveying.

Storing: When discharging into storage, endeavor to distribute sand uniformly throughout the storage area.

AFS grain fineness number of 69.71 was used. In test No. 1, the grain fineness of samples drawn from the storage bin varied from a low of 66.19 to a high of 72.32. In test No. 2 this spread ranged from 61.74 to 75.61. Test No. 3 showed a spread from 61.38 to 84.91. And test No. 4 varied from 51.98 to 81.65. The marked superiority of the No. 1 technique is evident.

These experiments demonstrated that the practice of using several or a large number of openings when withdrawing sand from storage is one of the best developed so far to minimize segregation. This practice should be encouraged as much as possible throughout the industry. The variation in sieve tests taken at various stages of unloading the test silo clearly indicate that segregation has been kept to a minimum.

It is safe to assume that these variations will occur in the sand when withdrawn from large storage areas. These measurements show that we would be making sand castings under varied conditions in spite of the fact that the base an-

Continued on page 56

ENGINEERED CASTINGS SHOWCASE

**Castings producers
proved their abilities to
castings buyers & designers
at Cincinnati show**

Along with 5400 visitors at the 1st Engineered Castings Show, MODERN CASTINGS was deeply impressed with the multitude and magnitude of applications served by the castings industry. After talking with each of the exhibitors producing castings your magazine has prepared this brief description of what each producer felt was his most unusual casting on display. We would like to have been able to show a photograph of every one of these fine castings but space limitations have prevented our doing so.

Advance Foundry Co., Dayton Ohio—Multi-spindle drill head casting, class 40 high density machine tool gray iron, 2270 lb weight.

Al-Fin Div., Fairchild Engine & Airplane Corp., Deer Park, L.I., N.Y.—Hydraulic manifold for airborne electronic antenna drive, aluminum alloy 356; hydraulic passageways formed with stainless steel tubing cast into the aluminum.

Alloy Steel Castings Co., Willow Grove, Pa.—Jet mill for grinding

Al-Fin casts aluminum around stainless steel tubing using multi-piece dry-sand mold.

fine materials to powder; stainless steel, saves 30 per cent in weight and 70 per cent in cost over former fabrication.

Alten Foundry & Machine Works, Lancaster, Ohio—Clutch and brake drum, alloy gray iron, 26 in. diameter by 12 in. thick, used on power shovel.

Aluminum Co. of America, Pittsburgh, Pa.—Industrial gas meter housing, cast in multi-piece permanent mold, aluminum alloy 356-T6, 95 lb weight, pressure tight at 100 psi.

Aluminum Industries, Inc., Cincinnati—Four-cylinder diesel engine block, aluminum alloy 355-T6, 260 lb weight, 97 oil bonded cores used.

Aluminum Permanent Mold Co., Grand Rapids, Mich.—Oil pan for gasoline engine, aluminum, 35 lb weight, cast in three-piece permanent mold, 36 cast-in bolt holes, 38 in. long x 14 in. wide x 14 in. deep.

Engineered Castings Div., American Brake Shoe Co., New York—Airscoop for guided missile, aluminum alloy HP 356, 0.100 in. thick wall, interior surface 125 Rms obtained with shell blown core.

American Light Alloys Inc., Little Falls, N. J.—Aircraft hinge bracket aluminum alloy HP 355, 44,000 psi tensile strength, 34,000 psi yield, and 8-13% elongation.

Arrow Aluminum Castings Co., Cleveland—Tractor manifold, aluminum alloy 333, cast in permanent mold at 2/3 cost of former sand casting.

Arwood Precision Castings Corp., New York—Military radar wave-

guides with soluble wax cores used for intricate internal coring.

Bendix Foundries, Bendix Aviation Corp., South Bend, Ind.—Cooling turbine for jet engine, magnesium alloy AZ92, 24 in. diameter, 72 eight-inch extruded blades set in green sand mold and cast into integral unit by pouring two rings around them.

Brown Foundry Corp., Camden, N. J.—Chill cast cylindrical billet 6 ft long by 4 in. diameter, manganese bronze, machined to 1/4 in. thick wall for hydraulic ejector cylinder.

Buckeye Foundry Co., Cincinnati—Showed photos of 26,000 lb, 16 1/2-ft high gray iron boring mill column.

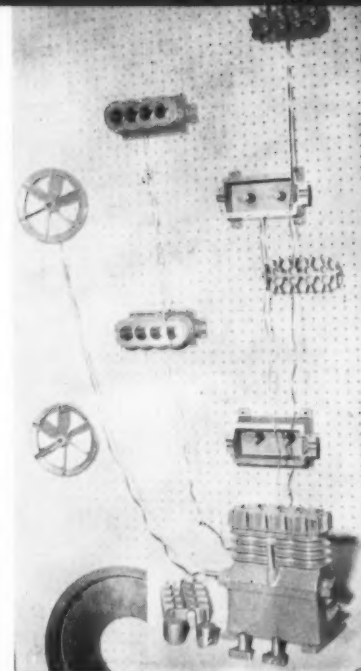
Campbell-Hausfeld Co., Harrison, Ohio—Four-cylinder air compressor for paint sprayer, gray iron, 20 lb; cast parts include flywheel, cylinder block, crankcase, cylinder head, pistons, and oil pump.

Century Foundry, Div., St. Louis—Valve for pumping system of naval ship, ductile iron, 240 lb weight.

Chicago Foundry Co., Chicago—Commercial stove griddle, class 20 gray iron, 63 lb weight, calrod units cast in the iron, frying surface must be free of defects.

City Pattern and Foundry Co., South Bend, Ind.—Fuel control body for jet engine, required 58 internal cores, 28 external cores, and 15 sets of dryers.

Dayton Steel Foundry Co., Dayton, Ohio—Rear wheel for 75-ton capacity off-the-road truck, medi-



Parts of compressor cast in iron by Campbell-Hausfeld Co.

um carbon steel, 230 lb weight, 24 in. diameter by 24 in. deep.

Dixie Bronze Co., Birmingham, Ala.—Water-cooled blast furnace tuyere cast in copper.

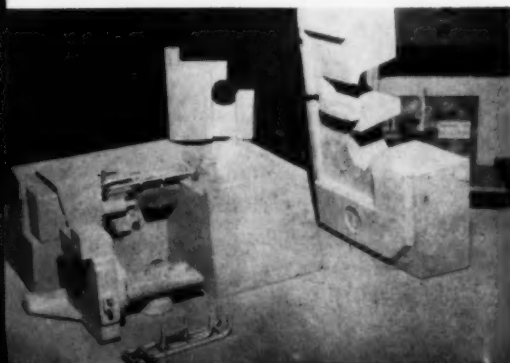
Doehler-Jarvis Div., National Lead Co., New York—Combination transmission case and converter housing, aluminum alloy 380, 16 lb weight, 5/32 in. wall, 40,000 psi tensile strength, die cast in 2-piece die with 3 slides for internal coring.

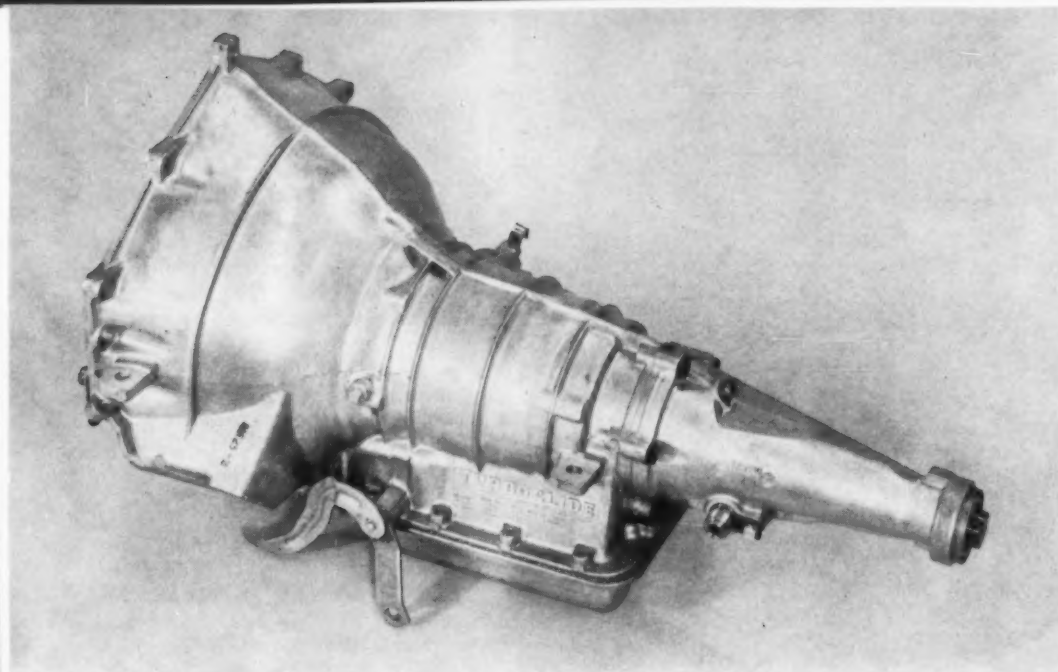
Duriron Co., Dayton, Ohio—Furnace seal-head casting used in manufacture of HF acid, high nickel austenitic stainless steel iron with Cb, 300 lb weight.

Eastern Malleable Iron Co., Marietta, Ohio—Turret support frame for automatic pinsetter in bowling alley, malleable iron, rapid changes in section sizes, press-straightened to 28 gauging points.

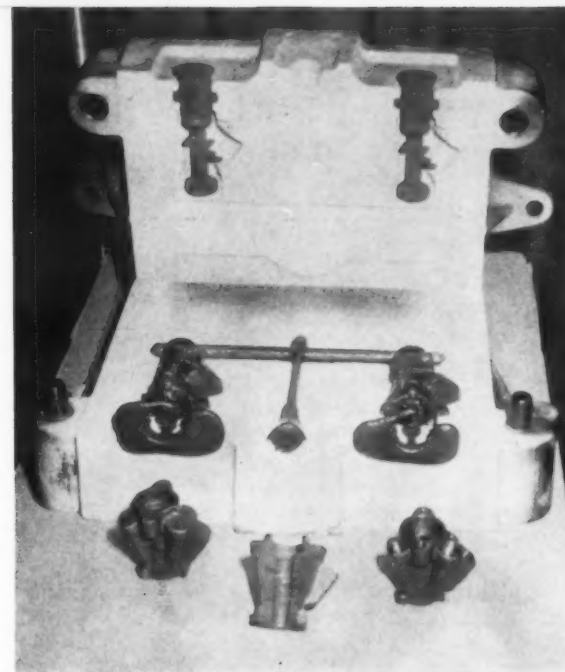
Eaton Manufacturing Co., Vassar, Mich.—Power-steering cylinder, gray iron, 4 lb weight, cast in permanent mold using shell core, 500 castings produced per two-cavity mold in 16 hr day.

Chris Ehrhart Foundry & Machine Co., Cincinnati—Ring gear, ductile iron type 80-60-03, 150 lb weight, better machinability, wear





Largest die casting in mass production is this aluminum housing cast by Doehler-Jarvis.



Permanent mold castings by Eaton Mfg. Co.

resistance and cheaper than cast steel gear it replaced.

Fabricast Div., GMC, Bedford, Ind.—Automotive air-cooled brake drum, aluminum alloy 356-T6, 16 lb weight, poured in 2-piece cast-iron permanent mold, iron liner cast into position to form braking surface.

Gibson & Kirk Co., Baltimore, Md.—Hatch cover for oil tanker, aluminum alloy 356-T6, 30 in. diameter, pressure tight, 25 per cent reduction in cost by replacing all-fabricated type.

Grede Foundries, Inc., Milwaukee—Ductile iron valve lined with a glazed ceramic for better handling of corrosive liquids.

Hamilton Brass & Aluminum Castings Co., Hamilton, Ohio—Feed nut for a hydraulic press, aluminum bronze, 390 lb weight, centrifugal cast.

Hamilton Foundry & Machine Co., Hamilton, Ohio—Head for radial drilling machine, class 40 gray iron, 1000 lb weight, used 54 baked sand cores; iron dense and machinable; 30 machined and drilled surfaces.

Hampden Brass & Aluminum Co., Springfield, Mass.—Radar horn, alu-

minum alloy 356-T6, 30 lb weight, 3/16 in. wall, cast in special dry sand core at 1/4 the cost of former plaster casting.

Howard Foundry Co., Chicago—Guided missile launcher base, aluminum alloy Almag 35, sand cast, 1500 lb weight, used 167 cores.

Janney Cylinder Co., Philadelphia—Loading cylinder sleeve, ductile ni-resist iron, centrifugally cast, replaces stainless steel.

Keokuk Steel Castings Co., Keokuk, Iowa—Radius arm clevis, SAE 1025 steel, replaced 6-piece weldment at 41 per cent reduction in cost.

Lebanon Steel Foundry, Lebanon, Pa.—Ceramicast flow divider and fuel selector of jet engine, Armco 17-4 PH stainless steel, meets Class I x-ray inspection.

Lynchburg Foundry Co., Lynchburg, Va.—Ductile iron crank, shell molded, 30 lb weight, replaced steel fabrication requiring 70 stamping, welding, and drilling operations.

Morris Bean & Co., Yellow Springs, Ohio—Access panel in missile wing, aluminum alloy HP 356, outer surface contoured aerodynamically, inner surface is waffle

grid to aid heat dissipation, 100 per cent x-ray sound.

Motor Castings Co., Milwaukee—Ordnance prime mover transmission housing, high tensile gray iron, 200 lb weight, required 39 core boxes with 100 loose pieces.

Mueller Industries, Inc., Aurora, Ill.—Three-ton gray iron wheel for polishing plate glass.

Nonferrous Foundries Inc., Indianapolis—Transformer secondary, pure electrolytic copper, 50 lb weight, 95.5 per cent electrical conductivity.

Oregon Metallurgical Co., Albany, Ore.—Cast titanium and zirconium valve bodies for handling aqua regia.

Peerless Foundry Co., Cincinnati—Air-cooled electric motor housing, gray iron, 30,000-40,000 psi tensile strength.

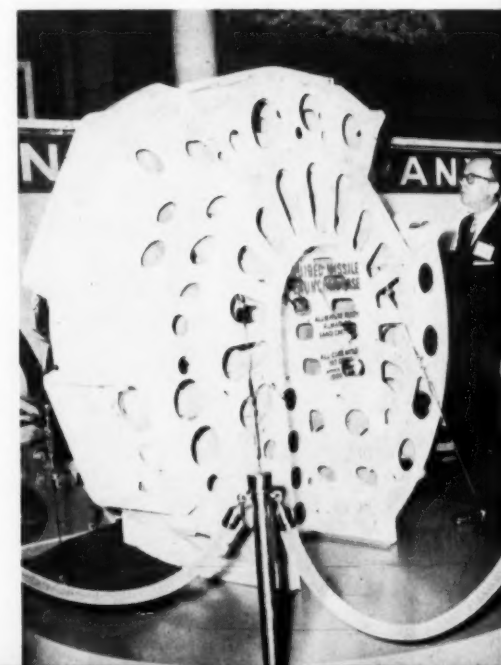
Peoria Malleable Castings Co., Peoria, Ill.—Variety of fittings and parts, pearlitic and ferritic malle-

Large aluminum base for guided missile launcher weighs 1500 lb—cast by Howard Foundry Company.

able iron, subjected to cobalt 60 and magnaflux inspection.

Pressco Casting & Mfg. Co., Chesterton, Ind.—Holders for carbon brushes in electric motors, silicon bronze, pressure die cast at 1/3 cost of investment casting.

Quality Aluminum Casting Co., Waukesha, Wis.—Oil pan for gasoline truck engine, aluminum alloy 319, 45 lb weight, 4 ft long x 15 in.

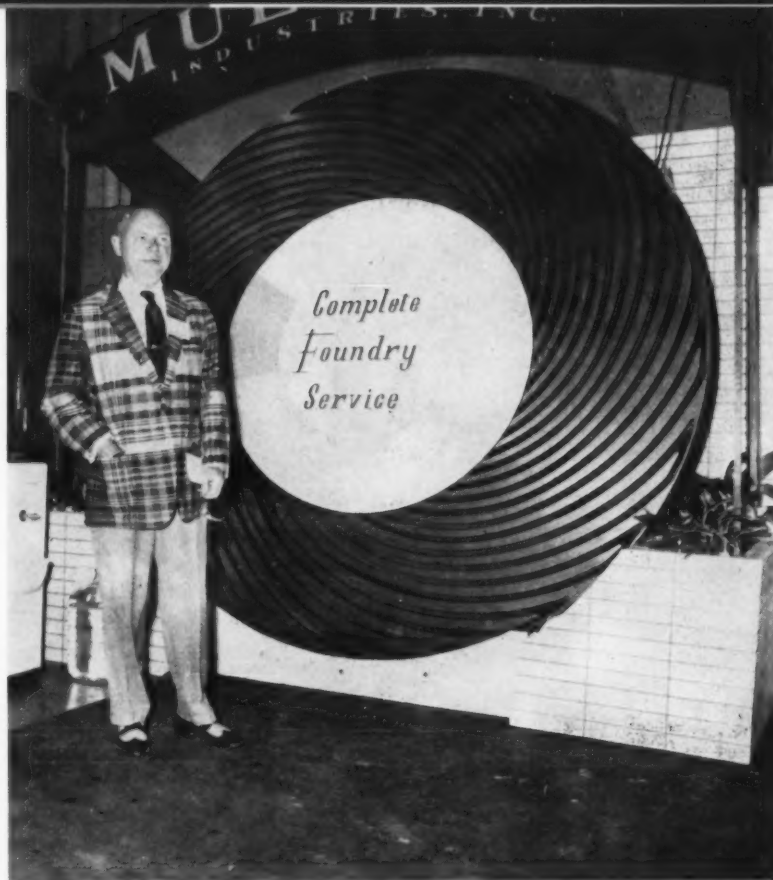




Ductile iron crank cast by Lynchburg Foundry Co. replaced the steel fabrication setting in background.

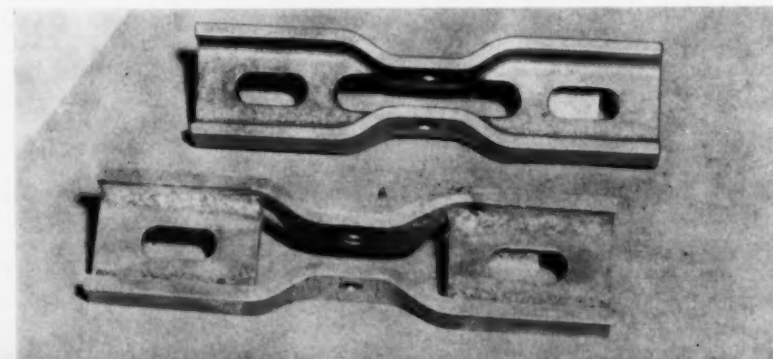
Heaviest casting in the Engineered Castings Show was this 3-ton iron wheel made by Mueller Industries.

Casting requirements for missiles are exemplified in access panel cast in aluminum by Morris Bean Co.



Casting intricate holes in aluminum casting was shown by Rolle Mfg. Co.

Gray iron conveyor load bar cast by Zenith Foundry Co. for 84 cents replaced the \$4.25 steel weldment shown here in the foreground.



wide x 12 in. deep x 1/4 in. wall, sand or permanent mold cast.

Reliable Castings Corp., Cincinnati—Gas heater housing for single room heaters, aluminum alloy 319, 20 lb weight, sand cast, finned on inside to pick up heat from flame and finned on outside to radiate heat.

Rolle Mfg. Co., Lansdale, Pa.—Airborne hydraulic control casting, aluminum alloy 356-T6, intricate 1/8-in. diameter holes cast internally to withstand pressure.

Sivyer Steel Casting Co., Milwaukee—Clutch-brake-gear, manganese moly steel (SAE 8630), cast in shell mold, 4-1/2 lb weight, replaced a fabrication of three pieces assembled by brazing, cast part 1/3 cost of former fabrication.

Superior Foundry, Inc., Cleveland,—Tractor transmission case, gray iron, metal melted in cupola and treated in electric arc furnace.

Symington-Gould Corp., Depew, N. Y.—Cradle frame of a bomb loading device, aircraft quality steel with 100,000 psi ultimate. Must be 100 per cent radiographically sound.

Universal Castings Corp., Chicago—Flight refuelling impellor, aluminum alloy 356-T6, vacuum cast in plaster, leading edge 0.010 in. thick, 60-80 Rms surface finish.

Wadsworth Foundry Co., Wadsworth, Ohio—Pallet sidewall casting, low alloy gray iron used for taconite sintering machine.

Wagner Malleable Iron Co., Decatur, Ill.—Torsion bar anchor for passenger car, pearlitic malleable, replaced three steel forgings welded together.

Waukesha Foundry, Waukesha, Wis.—Stainless steel aircraft castings, 1/8 in. sections, 180,000 psi tensile strength, resistant to high temperatures developed by friction.

Zenith Foundry Co., Milwaukee—Conveyor load bar, gray iron, 4 lb weight, carries 800 lb load, casting cost 84 cents, replaces 4-piece weldment requiring 4 forming operations, 8 weld beads, costing \$4.25.

AFS INSTITUTE PROGRAM UNDERWAY

Industry-sponsored program for supervisor training offers intensive training in foundry sciences

The castings industry is now richer by the services of 12 men, men who have undergone intensive and individual training in laboratory methods for sand testing. This training could be given these 12 foundry supervisors because the



Ray J. Hollfelder was first man registered for opening session. Ray was also a first prize winner in the 1957 AFS Apprentice Contest. He's from Zenith Foundry, Milwaukee.

castings industry organized the AFS Training and Research Institute to conduct the classes, and because eight skilled technologists

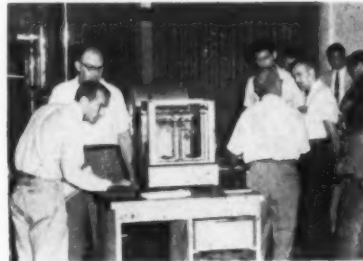


Small groups of students and many instructors are feature of the new training program.

were willing to devote their time as instructors.

The twelve men who have returned to their companies to apply their new knowledge are the first group to complete a job training course of the Institute. The course, "Sand Testing," was conducted July 15-19 at Rackham Memorial, Detroit. The course was presented as a working study of actual laboratory sand testing methods, and attracted a group of supervisors with plant capacities ranging from trainee to vice-president.

Students were divided into groups of three or four for personalized training and spent a full week working with the instructors.



Latest laboratory equipment for sand testing was used by the students for the classes.

The newest types of testing apparatus were made available for the course.

Instructors were: Harry W. Dietert, Harry W. Dietert Co., and president of the American Foundrymen's Society; Raymond Daksiewicz, Harry W. Dietert Co.; Wayne H. Buell, Aristo Corp.; Victor Rowell, Harry W. Dietert Co.; T. V. Linabury, National Engineering Co.; H. J. Jameson, Harry W. Dietert Co.; D. R. Chester, Archer-Daniels-Midland Co., Foundry Products Div.; and A. H. Zrimsek, Magnet Cove Barium Corp.

A second course in sand testing was presented August 19-23 and a third will be offered at Rackham Memorial September 9-13. It will be followed September 16-20 by a lecture course, "Sand Control for Shop Operations," which will describe sand control as a means of producing more salable castings.

An advanced lecture series, "Advanced Sand Technology," will be offered in Detroit, November 4-8. This course has been designed specially for men who have had considerable experience in sand technology. The AFS Institute reports that enrollments are still being accepted for all the remaining courses in sand testing and technology.

Of the five practical training courses scheduled by the AFS Institute during 1957, enrollments for two have already been closed due to capacity registrations. These courses are "Industrial Engineering," a working course in foundry

cost reduction through methods and standards, to be presented at the Marquette University Management Center, Milwaukee, September 23-27, and "Cupola Melting of Iron," covering the fundamentals of cupola operation, to be presented at the University of Illinois, Navy Pier, Chicago, December 2-6.

Institute Director S. C. Massari has stated that both over-subscribed courses will be repeated on dates to be announced.

The advance registrations for Institute courses now include registrants from 15 states, the Province of Quebec, and Mexico.

Men who completed the first class offered by the AFS Training and Research Institute were: Lawrence La Forges, foundry foreman, Zenith Foundry Co., West Allis, Wis.; Ray J. Hollfelder, trainee, Zenith Foundry Co., West Allis, Wis.; Howard Hunter, sand lab technician, Atlantic Steel Castings Co., Chester, Pa.; Joseph H. Barron, Jr., engineer, and Luke Ducharme, superintendent, Motor & Machinery Castings Co., Detroit; Frank S. Ryan, general manager and vice-president, St. Paul Brass Foundry Co., St. Paul, Minn.; A. Pilarowski, lab technician, Chrysler Corp., Detroit; Joseph Crivello, lab technician, Thiem Products, Milwaukee; Eugene Haying, foundry technician, Duriron Co., Dayton, Ohio; D. P. Mork, assistant superintendent, Mork Foundries, South Beloit, Ill.; John Waelchli, foundry foreman, Budd Co., Detroit; John L. Brandt, Milwaukee.

Headquarters for the AFS Training and Research Institute are at the American Foundrymen's Society, Des Plaines, Ill.



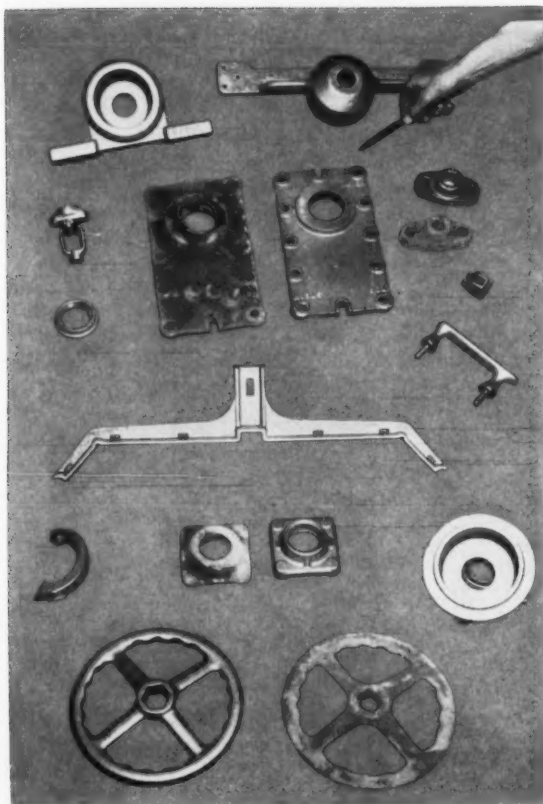
AFS President H. W. Dietert addresses students and instructors at opening session. Mr. Dietert was also one of the instructors. Left to right: Instructor T. V. Linabury, D. P. Mork, J. L. Brandt, L. La Forges, J. Waelchli, Instructor A. H. Zrimsek, R. J. Hollfelder, Instructors H. J. Jameson and V. Rowell, H. Hunter, E. Haying, AFS Director S. C. Massari, Jess Toth, AFS Detroit Chapter; J. Crivello, F. S. Ryan, Instructor W. H. Buell, J. H. Barron, Jr., Instructor R. Daksiewicz, and L. Duchare.

AFS Institute Courses for 1957

- No. 1 . . Sand Testing**
September 9-13
- No. 2 . . Sand Control for Shop Operations**
September 16-20
- No. 3 . . Industrial Engineering**
September 23-27
- No. 4 . . Advanced Sand Technology**
November 4-8
- No. 5 . . Cupola Melting of Iron**
December 2-6

WHEELABRATOR[®]
STEEL SHOT
cuts abrasive costs for
ALL TYPES
of foundries

**GRAY
 IRON
 FOUNDRY**
*reduces abrasive
 consumption*
75%



Castings shown here before and after cleaning illustrate the thorough cleaning accomplished with Wheelabrator Steel Shot.

Cleaning an average of 13 tons of gray iron castings a day, the Plainville Castings Co., Westfield, Mass., used to consume 100 lbs. of chilled iron shot every day and 200 lbs. of malleable iron shot every week.

On the basis of a 4-week month this adds up to a total of 2,800 lbs. of abrasive per month. With Wheelabrator Steel Shot, the heat treated electric furnace steel shot, the same amount of cleaning is accomplished with only 400 to 500 lbs. per month.

Besides achieving these outstanding reductions in shot consumption and shot costs, Wheelabrator Steel Shot also provides "a beautiful finish, in comparison to the other abrasives," according to Joe Stopski, Foundry Superintendent. "We also find that our maintenance costs are lowered" the superintendent adds.

Wheelabrator Steel Shot is bringing savings in abrasive consumption, abrasive costs, maintenance expense and parts replacement to all types and sizes of foundries. Why don't you let this versatile shot save for you, too?

Write today for your free copy of Bulletin 89-8 for more information on Wheelabrator Steel Shot.



WHEELABRATOR
 CORPORATION

630 South Byrkit Street

Mishawaka, Indiana

Circle No. 144, Page 7-8

Sand Segregation

Continued from page 51

alysis of the sand is satisfactory. Casting finish and other variables will vary rather substantially.

Sand producers and foundrymen should make every possible effort to draw sand from storage using as many openings at the base of their bins or silos as possible. These openings should be distributed uniformly over the complete base of the silo or bin. In addition, the orifice-type discharge is being used successfully and should also be considered.

Members of the AFS Grading, Fineness & Distribution Committee (8-F) which conducted this work are. Chairman T. W. Seaton, *America Silica Sand Co., Inc., Ottawa, Ill.*; Vice-Chairman J. G. Smillie, *John Deere & Co., Materials Engineering Dept., Moline, Ill.*; R. W. Bennett, *Walter Gerlinger, Inc., Milwaukee*; W. D. Chadwick, *Manley Sand Co., Rockton, Ill.*; L. F. Dennie, *Technical Service, Detroit*; George DiSylvestro, *Burnside Steel Foundry Co., Chicago*; H. E. Donnocker, *Ottawa Silica Co., Ottawa, Ill.*; E. M. Durstine, *Keener Sand & Clay Co., Columbus, Ohio*; H. S. Fagan, *The Fahrallloy Co., Harvey, Ill.*; F. P. Goettman, *Standard Sand Co., Grand Haven, Mich.*; L. D. Marinelli, *Kensington Steel Co., Chicago*; R. E. Morey, *Metallurgy Div., Naval Research Laboratory, Washington, D. C.*; George Nestor, *National Malleable & Steel Castings Co., Cleveland*; J. S. Schumacher, *Hill & Griffith Co., Cincinnati*; J. A. Schumann, *Carpenter Bros., Inc., Milwaukee*; E. W. Smith, *Eugene W. Smith, Foundry Materials, Chicago*; N. J. Stickney, *Sand Products Corp., Cleveland*; T. A. Tarquinio, *American Manganese Steel Div., Chicago*; L. E. Taylor, *Goebig Mineral Supply Co., Chicago*; Stanton Walker, *National Industrial Sand Association, Washington, D. C.*; S. A. Wick, *New Jersey Silica Sand Co., Millville, N. J.*

MORE FACTS on all products, literature, and services shown in the advertisements and listed in Products & Processes and in For the Asking can be obtained by using the handy Reader Service cards, pages 7-8.

M. HOLTZMAN METAL CO.

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GUARANTEED Brass, Bronze and ALUMINUM INGOT to your specifications **IMPROVED WITH FACTOR "X"!** Send us a sample order! If you want to improve the quality of your finished products at no additional cost... let us show you what HOLMCO ingot, improved with Factor "X" can mean to you!

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Circle No. 145, Page 7-8

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Determine proper gating faster, eliminate slag inclusions, stop rejects, reduce cleaning room time, and lower production costs. **UNIVERSAL** refractory gating components will help you do this, and at less cost than producing your own from sand. Send specifications for price and delivery quotations, or call **SANDUSKY 4631**

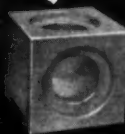
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Circle No. 146, Page 7-8

Mechanization Requires Redesigning of Equipment

GLENN W. MERREFIELD /
Giffels & Vallet, Inc.*

Mechanization in foundries at present is confined to islands of batch operations. Automatic mechanization is the process of tying these islands into a complete chain. To achieve automation, designers will have to advance from the batch stage and also improve materials handling equipment.

Future possibilities in foundries includes remote control of operations using closed-circuit television and self-regulating controls. First steps taken in this direction are automatically controlled sand systems and automatic sand mixing.

Considerable progress has been made toward mechanization of certain foundry processes. Coreblowers, CO₂ cores and shell molding are examples of automation in coremaking. In molding, operations have been speeded by such machines and jolt squeeze, sand slingers, and diaphragm molding.

In mechanized molding operations, flask design must be given special consideration. To be able to withstand higher pressures associated with diaphragm and high pressure squeeze cylinders, flask flanges are being increased, sometimes to widths of several inches. Ribs on flask sidewalls must be deeper and on closer centers. Flask material must be chosen carefully and metal sections generously increased.

In addition to accurate machining for the round and elongated pin centers and joints on flask sections, the following accurate locating points must be used on flasks for mechanized molding:

- Pushoff pin locations.
- Stops for positioning flasks over pin centers and placing flasks on the machine.
- Locating points on drag flask for mechanical roll-over.
- Locating points for placing drag flask on conveyor and for mold closing.
- Locating points for guiding cope flask and mechanical closing.
- Clamping or weighting points.

At present the foundry industry is in part dependent upon the human element to reduce variations in production and quality. This had produced wide variations in working rates and dependence on the judgment of workers. Automatic controls extend the operator's ability to produce without added physical or mental effort.

*This article is based on a talk given by Glenn W. Merrefield, Giffels & Vallet, Inc., before the AFS Detroit Chapter.

STROMAN

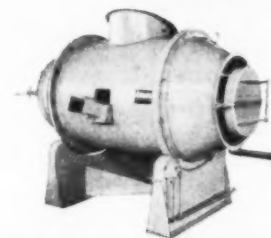
FURNACES For IRON or BRASS

Here are two exceptional Stroman Furnaces that will give you better melts, better castings and cut costs to the bone. Designed by the leading metallurgical engineers they will do their jobs more efficiently, faster and economically than old fashioned equipment. To compete in the foundry market you must modernize... and Stroman Foundry Equipment is the most modern and best you can buy.

INVESTIGATE THEM TODAY!

IRON MELTING

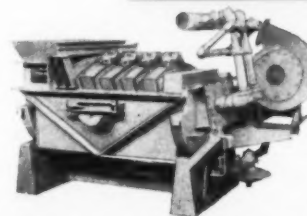
STROMAN
TYPE "R.F."
BARREL
FURNACE



This open flame, barrel type furnace with burners firing tangent to the inside of the lining is designed to produce an ideal combustion arrangement for very fast melting of iron. It is applicable to jobbing gray iron foundries for its speedy melting cuts labor and fuel costs. It is easily charged. Capacities up to 20,000 lbs. iron.

BRASS MELTING

STROMAN
TYPE "JC"
CRADLE TYPE
TILTING
FURNACES



For melting COPPER BASE AL-

LOYS of low zinc content (not exceeding 7% zinc) these furnaces are the most economical available. Their rapid melting time, from 15 minutes up depending on the size of furnace assures lowest fuel consumption and as always in a Stroman Furnace maintenance is at a minimum. Operators are not exposed to excessive heat making excellent working conditions. They are recommended for production work. Capacities range from 400 pounds up to 20,000 pounds per heat.

Stroman makes all types of furnaces for the melting of brass, bronze, aluminum, iron, magnesium and all other non-ferrous metals. Write for new bulletin #150 describing Stromans complete line including metal handling and conveyor equipment.

STROMAN FURNACE AND
ENGINEERING CO.
FRANKLIN PARK, ILLINOIS

Circle No. 147, Page 7-8

September 1957 • 57

Radiant® foundry coke

...for better cupola operations

Made by men who intimately know foundry requirements—that's "Radiant" foundry coke from Tennessee Products. This high grade foundry coke resists breakage, and may be screened to size for your particular cupola operations. It is made from a blend of coals which produce uniformly "tough" high carbon coke, with low porosity and low sulphur. It is produced in modern by-product ovens, employing modern techniques and equipment.

Tennessee Products is also your best source for: pig iron; ferromanganese; ferrosilicon; high, low and medium carbon ferrochrome; and ferrochrome silicon in any size or form—including briquettes.



TENNESSEE
PRODUCTS & CHEMICAL
Corporation
NASHVILLE TENNESSEE

A DIVISION OF THE CHEMICAL, PAINT AND METALLURGICAL DEPARTMENT OF MERRITT-CHAPMAN AND SCOTT CORPORATION

Method of Preparing Cast Iron for Microscopic Work

J. R. DRIEAR / Supervisor of Metallurgical Lab.
Eaton Mfg. Co., Detroit.

■ When cast irons are being prepared for microscopic examination, trouble is frequently encountered when graphite flakes are pulled out by the polishing process. (Fig. 1, about 200X). This condition can be misleading, particularly in classifying



Fig. 1 . . Graphite pulled out.

the structure as to graphite type.

An easy way to polish specimens without pulling out the graphite is to make a sandwich on the wheel by first putting on a polishing cloth and



Fig. 2 . . Graphite intact.

over this a silk cloth. Use this wheel in the regular manner using sufficient water and an alumina polishing compound to get polished structures with graphite intact as shown in Fig. 2. (about 200X).

G.I.F.S. Releases Manual

"The Machining and Grinding of Gray and Nodular Cast Irons," a 57-p manual, has been released by the Gray Iron Founders' Society. The manual is intended for use in the design, engineering, and production of cast components. Copies may be purchased from G.I.F.S. headquarters in Cleveland.

patent review



MELVIN NORD, Dr. Eng. Sci., LL. B.
Consultant in Law and Engineering

Sounder Shell Mold Castings

A method of carbonizing the binder in shell molds through use of a non-oxidizing atmosphere is said to reduce the volatiles given off during pouring, thus producing sounder castings.

The volatile constituents are driven off by heating the molds in an inert or reducing atmosphere for 15 to 90 minutes at a temperature of at least 300 F. 2,772,457, issued Dec. 4, 1956 to Fred J. Webbere and assigned to General Motors Corp.

Releasing Shell Patterns

Metal pattern equipment for shell molding can be released from the shells by heating the pattern to 250 F and then coating it with a mixture of carnauba wax and emulsifier in water. 2,770,859, issued Nov. 20, 1956 to Donald J. Henry and assigned to General Motors Corp.

Other Patents

Locking means for centrifugal molds. 2,771,647, Albert B. Hemstreet.

Anodized aluminum patterns for shell molding. 2,771,850, General Motors Corp.

Cupola stock line indicator. 2,772,006, Modern Equipment Co.

Sand rammer. 2,772,453, Foundry Equipment Ltd.

Continuous pressure casting. 2,772,454, Joseph B. Brennan.

Pouring apparatus for continuous casting. 2,772,455, Allegheny Ludlum Steel Corp.

Continuous casting. 2,772,459, Wieland Werke A. G.

Flask for soil pipe. 2,773,290, William G. Reichert.

Ferrous chrome alloy. 2,773,761, Calumet Steel Castings Corp.

Ladle maintenance apparatus. 2,774,123, June H. Reighard.

Mold assembly device for torque converter casings. 2,775,007, International Harvester Co.

burg Times Herald

JANUARY 15, 1957

BETTER PRODUCTS SECTION

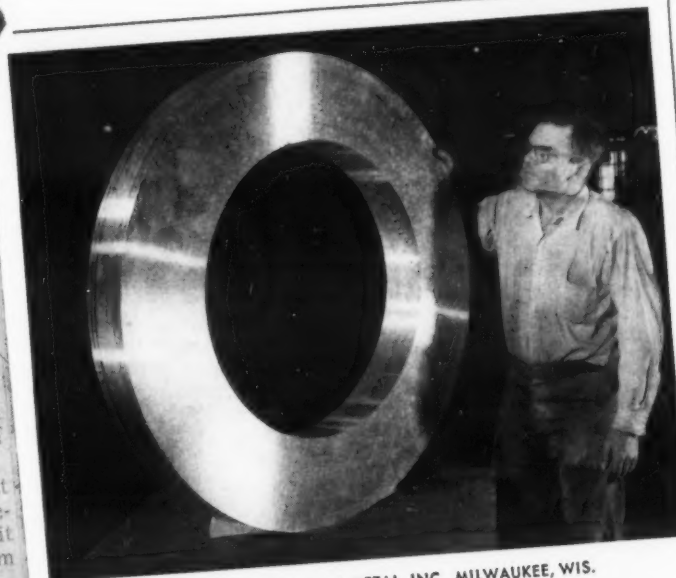


PHOTO COURTESY AMPCO METAL, INC., MILWAUKEE, WIS.

LITHIUM DE-OXIDIZES HUGE COPPER CASTING 99.8% Conductivity Obtained

MINNEAPOLIS—Special Ampco Metal, Inc., Milwaukee, Wis., obtained high structural soundness and electrical conductivity for the centrifugally cast copper ring (photo above) used in casting aluminum.

As-cast weight of the ring was 1800 lbs. Approximate as-cast size is 50" O.D., 6" thick.

LESS THAN 1/5 of a pound of metallic lithium added to the melt resulted in a dense, oxygen-free

casting minus only .2% of being 100% conductive.

AS LITTLE AS 0.005% (2 1/4 gram cartridge) refines high temperature copper, brass, bronze, and nickel-silver, producing a sounder, more uniform casting.

THE SALTS of Lithium, Carbonate and Chloride benefit the heat treater by lowering bath melting points.

Is your foundry using Lithium? Our banks of electrolytic cells can supply experimental grams or commercial tons. Send for details of actual foundry tests.

(ADVERTISEMENT)

Lithium Firm Doubles Sales for 9 Months

Lithium Corporation of America, Minneapolis, reported Thursday that in the first nine months of 1956 its net sales were more than double those in the same 1955 period.

Herbert W. Rogers, president, in a report to stockholders, said sales were \$8,699,028 in the nine-month period, compared with \$4,276,000 in the same period a year ago.

Green Giant to Spend 2 1/2 Millions on Can Plant and Warehouses

... trends ahead in industrial applications for lithium

member of...



PROCESSORS OF LITHIUM METAL • METAL DISPERSIONS
METAL DERIVATIVES: Amide • Hydride
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Cat Lake, Manitoba • Amos Area, Quebec
PLANTS: St. Louis Park, Minnesota • Bessemer City, N. C.
RESEARCH LABORATORY: St. Louis Park, Minnesota

Circle No. 149, Page 7-8



LITHIUM CORPORATION
OF AMERICA, INC.

2605 RAND TOWER, MINNEAPOLIS 2, MINN.



news



Texas Chapter held its first Annual Past Chairman's Dinner at Fort Worth, Texas. Some of the Past Presidents attending this May meeting were, left to right: W. A. Bearden, M. A. Bell Co., Houston; P. B. Croom, Houston Pattern Works, Houston; Israel Smith, Western Foundry, Tyler; C. R. McGrail, Alamo Iron Works, San Antonio; Marvin Williams, Houston Foundry & Machine Co., Houston; and Ed. W. Wey, Dee Brass Foundry, Houston.



Cost accounting and formation of mid-west cost groups of the **Non-Ferrous Founders' Society** brought these foundry executives together July 19 in the Orrington Hotel, Evanston, Ill. In addition to planning cost groups in Chicago, Milwaukee, and St. Louis, the meeting also considered standardization of forms, credit, terms and conditions of sale, ratio analysis, and insurance. Attending the meeting at the invitation of Wm. A. Gluntz, Gluntz Brass & Aluminum Foundry Co., Cleveland, chairman of the NFFS Cost Committee, were (seated, clockwise): Robert Schuchardt, Carl Bajohr Co., St. Louis, chairman, St. Louis Chapter; John J. Lang, CPA, St. Louis; A. J. Messmer, Messmer Brass Co., St. Louis, national director; Chester K. Faunt, Christensen & Olsen Foundry Co., Chicago; Mr. Gluntz; Herbert F. Scobie, executive Secretary, Evanston; Jeff Alan Westover, Westover Engineers, Milwaukee, Wisconsin Chapter chairman; George E. Tisdale, Lawran Foundry Co., Milwaukee; L. J. Andres, Law-

ran Foundry Co., Milwaukee, alternate director; Wallace Larson, Reliance Pattern Works, Chicago, Chicago Chapter chairman; and Grant Roth, Ace Foundry Co., Chicago. Standing (left to right) are: Jack Gibfried, Capital Brass & Aluminum Foundry Co., Chicago, 2nd vice-chairman, Chicago Chapter; Don Lubnow and W. F. Duddeck, both of Wisconsin Centrifugal Foundry, Inc., Waukesha, Wis.; George B. Hazen, Brass Foundry Co., Peoria, Ill.; and H. A. White, Smeeth Harwood Co., Chicago, director-at-large.

Missouri Valley Regional To Also Have Lighter Side

■ Henry C. Deterding, Sonken-Galamba Corp., the general chairman of the 1957 Missouri Valley Regional Conference has announced that the September 27-28 meetings will include some lighter activities in addition to the technical program which was published in the August MODERN CASTINGS.

Mr. Deterding states that on the

lighter side the conference will feature the "Ozark Hillbilly Jamboree" with a real "Missouri hills" flavor, including local folk music and entertainment. Conferees wanting to fish can do so in many streams and lakes near the Rolla, Mo., conference site, Mr. Deterding reports.

The campus of the Missouri School of Mines and Metallurgy, Rolla, Mo., is the location of the conference which will start Friday morning, September 27, and which will close at noon Saturday, September 28.



Western New York Chapter Chairman Edmund Burke, right, accepts gavel and congratulations from out-going Chairman Milton D. Emery at the annual smorgasbord dinner held during May in Buffalo, N.Y.

AFS Directory of Chapter Officers, Directors Mailed

■ The new 1957-1958 AFS Directory of Chapter Officers and Directors has been prepared and mailed to all

Chapter officers, directors, and committee chairmen.

This year the directory has been expanded to include the official schedule of AFS events, chapter meeting places and dates, and a listing of national officers and directors.

Following past custom the directory will serve as a handy reference for locating the names, addresses and titles of local chapter officers, directors and committee chairmen.

Michigan Regional Conference to Have Wide Subject Range

■ The Michigan Regional Foundry Conference for 1957 will present a series of panels and papers whose topics will range from gamma radiography to preventive maintenance in the foundry. The conference will be held October 2-3 at Michigan State University, East Lansing, and is sponsored by the Central Michigan, Detroit, Saginaw Valley and Western Michigan Chapters of the American Foundrymen's Society, and by Michigan State University and the University of Michigan.

Conference chairman is R. B. Kropf, International Nickel Co., and the vice-chairman and program chairman is Wm. E. Truckenmiller, Albion Malleable Iron Co.

The conference program:

WEDNESDAY, OCTOBER 2

9:00 am . . Registration.
9:45 am . . Presiding: W. C. Truckenmiller. "Welcome to MSU," Dr. J. D. Ryder, dean of engineering, Michigan State University.

10:00 am . . Core session. "CO₂ Process," C. W. Meyer, Central Foundry Div., General Motors Corp.; "Gasified Process," speaker to be announced; "Core Shooting," R. H. Greenlee, Auto Specialties Mfg. Co., St. Joseph, Mich.

12:30 pm . . Luncheon. Toastmaster: Dr. R. A. Flinn, University of Michigan. Speakers: "Comments on Progress in Foundry Training," AFS President Harry



Members of the Pennsylvania State University Student Chapter shown at meeting during regular school session. Seated left to right are advisors and chapter officers: co-advisor W. P. Winter, Treasurer Ralph S. Schrader, Corresponding Secretary Joseph J. Zaborny, Chairman Daniel F. Keller, Vice-Chairman Michael P. Eleftherion, and co-advisor D. W. Clark.



W. Dietert; "Creative Management," Dr. Harold Sylvester, Michigan State University.

2:30 pm . . Panel discussion of preventive maintenance. Presiding: F. H. Hutchins, Engineering Castings, Inc., Marshall, Mich. Speakers: "Air," Wm. Williamson, Chevrolet Grey Iron Foundry, Saginaw, Mich.; "Belting," James Stewart, Chrysler Corp., Detroit; "Bearings," speaker to be announced; "Electrical Equipment," speaker to be announced.

6:30 pm . . Dinner. Toastmaster: Robert Dodge, Archer-Daniels-Midland Co. Speakers: AFS General Manager Wm. W. Maloney; Student Award Presentation, Henry Laforte, Pontiac Motor Div., General Motors Corp.; Fordy Anderson, Michigan State University basketball coach.

THURSDAY, OCTOBER 3

10:00 am . . "Quality Control—Scrap Reduction," a panel presentation. Presiding: D. I. Jacobsen, Grand Haven Brass Foundry, Grand Haven, Mich. Speakers: "Non-ferrous Foundry," Robert Cope, Rapidcast Corp.; "Steel Foundry," B. Duncan, West Michigan Steel Foundry; "Gray and Malleable Iron Foundries," B. Stern, Lakey Foundry Corp.

11:15 am . . "Gamma Radiography," D. M. Murray, Albion Malleable Iron Co. 12:30 pm . . Luncheon. Toastmaster: Dr. Austen Smith, Michigan State University. Speaker: Brendan Sexton, CIO-AFL.

2:30 pm . . "Shell Molding Developments at Ford Motor Co. Speaker: Harold C. Grant, Dearborn Specialty Foundry, Ford Motor Co. Panel discussion follows paper. Panel members are: Mr. Grant; R. W. Gardner, Dearborn Iron Foundry; Arthur Adams, Dearborn Specialty Foundry; Walter Blyler, Dearborn Iron Foundry; George Beals, Dearborn Specialty Foundry.

6:30 pm . . Banquet. Toastmaster: Horace Dean, Campbell-Wyant-Cannon Foundry Co. Speaker: Dr. Carl Winters.

New England Regional Slated for October 18-19

■ New England foundrymen will be offered a broad program of technical sessions dealing with topical subjects at the 17th New England Regional Foundry Conference to be held October 18-19 at the Kresge Auditorium, Massachusetts Institute of Technology, Cambridge.

The program is sponsored by the AFS New England Chapter and planning has been directed by the conference's general chairman, A. M. Nutter, E. L. LeBaron Foundry Co., Brockton, Mass., and by vice-chairman Clyde Armstrong, Warren Foundry

and Pipe Division, Shanmoon Industries, Everett, Mass.

The tentative conference program follows:

FRIDAY, OCTOBER 18

9:00 am . . Registration.
9:45 am . . Opening of conference and address of welcome

10:15 am . . General session. "The Future of New England Foundries," Howard Taylor and Charles Reynolds, M.I.T.

2:00 pm . . Ferrous session. "Epoxy Resin," M. H. Young, U. S. Gypsum Co., Chicago.

Non-ferrous session. "Design for Quality," R. A. Colton, Federated Metals Div., American Smelting and Refining Co.

3:30 pm . . General session. "Marketing," R. C. Meloy, Gray Iron Founders' Society.

6:30 pm . . Conference dinner at M. I. T. Faculty Club, 50 Memorial Drive, Cambridge. Speaker to be announced.

SATURDAY, OCTOBER 19

9:00 am . . Ferrous session. "Which Process," A. Dorfmueller, Jr., Archer-Daniels-Midland Co., Cleveland.

Non-ferrous session. "Waterless Sand," R. G. Megaw, Baroid Div., National Lead Co., Chicago.

10:30 am . . General session. "Managing a Foundry Professionally," Glenn Cook.

1:30 pm . . Ferrous session. "Material Handling," Speaker to be announced.

Non-ferrous session. "Limited Mechanization," Mr. Koelher.

3:00 pm . . Ferrous session. "Metal Injection," speaker to be announced.

Non-ferrous session. "Treatment of Non-Ferrous Metals," R. W. Ruddle, Foundry Services, Inc., Columbus, Ohio.

AFS Library Adds Papers From International Meet

■ Details of developments in cast metals technology on a world-wide scale are found in the two-volume set of papers presented at the 24th International Foundry Congress in Stockholm, August 19-24.

One set of the volumes is now on deposit in the library of the American Foundrymen's Society, Des Plaines, Ill. The 28 papers include 16 in English. American authors whose work is represented among the papers are: R. L. Olson, H. J. Weber, H. W. Dietert, Alex Graham, and Randolph Dietert.

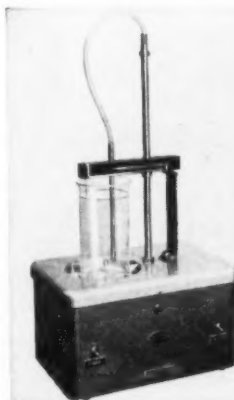
The two-volumes sets may be purchased from Sveriges Mekanförbund, Foundry Section, Karlavagen 43, Stockholm, Sweden.

Continued on page 62

ENJOY THE BETTER THINGS OF LIFE

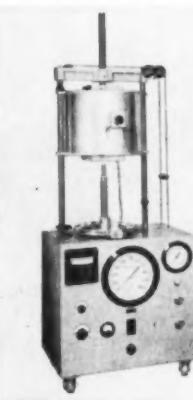


Why overwork yourself? Dietert-Detroit Sand Control Units can help you PRODUCE BETTER CASTINGS AT LOWER COSTS IN LESS TIME.



AUTOCLAY . . . No. 513

Saves operator's time in running A.F.S. clay substance test. Better castings and easier molding result from sands with controlled clay content. To obtain better casting finish, improve sand grain distribution, control fineness.



THERMOLAB . . . No. 785

For clean castings, free of defects. Test and control the high temperature properties of your molding materials with the Dietert-Detroit Thermolab. Reduce or eliminate scabs, cuts, etc.



MOISTURE TELLER . . . No. 276

Control moisture content in your molding sands and you will control the greatest variable causing defects in any foundry. The No. 276 takes but a few minutes to check moisture content.



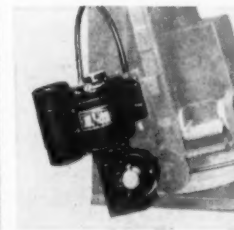
RAGONE . . . No. 4210

Measure fluidity of ferrous and non-ferrous metals in seconds. Take the guess-work out of pouring requirements—know when your metal will flow properly to fill the mold.



MOLD HARDNESS TESTER . . . No. 473

Molds too soft? Rough surface can result. Molds rammed too hard? You may get rat-tailed or buckled castings. Be sure your molds are properly rammed, use the No. 473 Hardness Tester.



MOTOR DRIVE . . . No. 401

Eliminate the human variable of hand loading . . . equip your hand-operated sand strength machine with a No. 401 Motor Drive.

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| <input type="checkbox"/> Thermolab No. 785 | <input type="checkbox"/> Mold Hardness Tester No. 473 |
| <input type="checkbox"/> Moisture Teller No. 276 | <input type="checkbox"/> Motor Drive No. 401 |

Name _____
Company _____
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City _____ State _____



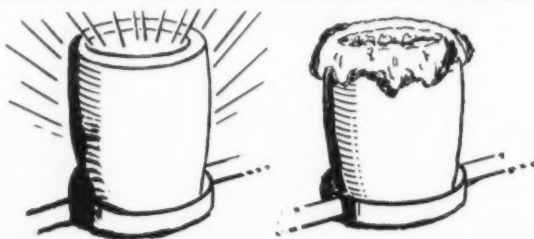
news

Continued from page 61 A.S.T.M. Honors AFS Members

■ Three of twelve members of the American Society for Testing Materials who received Awards of Merit at the group's recent meeting were

representatives of the metal castings industry.

The awards recognize individuals who have rendered technical services to the society. The three foundrymen honored for their services were: John W. Bolton, (retired), The Lunkenheimer Co., Cincinnati; Donald L.



Not Too Hot ... Not Too Cold

Pouring at just the right temperature is the big thing! Casting the metal at exactly the right heat is the thing that assures sound, uniform casting results. As you know, foundry operations are now too costly to be wasted on gassed castings, cold-shuts or misruns!

This is where Marshall Enclosed-Tip Thermocouples will help you, as they are helping other foundries everywhere. Marshall Thermocouples will measure the temperature of your molten brass, aluminum and magnesium quickly and dependably. They are always easy to use and always ready.

Marshall Enclosed-Tip Thermocouples are made in two types for use in furnace or ladle. Send for free descriptive literature. L. H. Marshall Co., 270 W. Lane Ave., Columbus, Ohio.



Circle No. 152, Page 7-8

Colwell, Apex Smelting Co., Cleveland; and the late William A. Kennedy, The Grinnell Co., Inc., Providence, R. I.

afs chapter meetings

SEPTEMBER						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

SEPTEMBER

Birmingham District . . Sept. 14 . . Cascade Plunge, Birmingham, Ala., Annual Picnic.

British Columbia . . Sept. 20 . . Pacific Athletic Club, Vancouver, B.C. . . H. J. Weber, AFS, "Legislation Affecting Foundries."

Canton District . . No Meeting.

Central Illinois . . No Meeting.

Central Indiana . . Lake Shore Country Club, Indianapolis . . Annual Stag Outing.

Central Michigan . . Sept. 18 . . Marywood Country Club, Battle Creek, Mich. . . L. J. Pedicini, Process Development Section GMC, "Quality Control in the Foundry."

Central New York . . Sept. 13 . . Trinkaus Manor, Oriskany, N.Y. . . M. Bock II, Exomet, Inc., "Exothermic Compounds—Insulated Risers."

Central Ohio . . Sept. 9 . . Seneca Hotel, Columbus, Ohio . . T. E. Barlow, Eastern Clay Products Dept., International Minerals & Chemicals Corp., "Green Sand Molding."

Chesapeake . . Sept. 27 . . Engineers' Club, Baltimore, Md. . . W. B. Bishop, Archer-Daniels-Midland Co., "Which Core Process."

Chesapeake, Southern Section . . No information available.

Chicago . . No Meeting.

Cincinnati District . . Sept. 9 . . Cincinnati Club, Cincinnati . . E. E. Pollard, Tyler Pipe & Foundry Co., "Water-Cooled Cupola," and W. Romanoff, H. Kramer & Co., "Brass and Bronze Foundry Practice."

Connecticut . . Sept. 24 . . Waverly Inn, Cheshire, Conn.

Corn Belt . . No Meeting.

Detroit . . No Meeting.

Eastern Canada . . Sept. 13 . . New Sherbrooke Hotel, Sherbrooke, Quebec.

Eastern New York . . Sept. 17 . . Pannetta's Restaurant, Menands, N.Y.

Metropolitan . . No Meeting.

Mexico City . . No Meeting.

Michiana . . No Meeting.

Mid-South . . Sept. 13 . . Claridge Hotel, Memphis, Tenn. . . Mrs. T. Brashear, M. B. Parker Co., "Foundry Cost."

Missouri Valley Regional Foundry Conference . . Sept. 27-28 . . University of Missouri, Rolla, Mo. Sponsored by Mo-Kan, St. Louis and Tri-State Chapters of AFS and Missouri School of Mines Student Chapter.

Mo-Kan . . Sept. 6 . . Fairfax Airport, Kansas City, Kans.

New England . . Sept. 11 . . Whitin Machine Works, Whitinsville, Mass., Plant Visitation.

Northeastern Ohio . . Sept. 12 . . Tudor Arms Hotel, Cleveland . . V. A. Crosby, Climax Molybdenum Co., "Engineered Castings With Reference To Automation."

Northern California . . Sept. 16 . . Spengers', Berkeley, Calif. . . H. J. Weber, AFS, "Legislation Affecting Foundries."

Northern Illinois & Southern Wisconsin . . Sept. 11 . . Country Club of Beloit, Beloit, Wis.

Northwestern Pennsylvania . . Sept. 23 . . Amity Inn, Erie, Pa. . . H. H. Johnson, National Malleable & Steel Castings Co., "Properties of Malleable & Pearlitic Malleable Irons."

Ontario . . Sept. 27 . . Royal Connaught Hotel, Hamilton, Ont. . . R. Meloy, Gray Iron Founders' Society, "What the Customer Wants From You."

Oregon . . Sept. 18 . . Heathman Hotel, Portland, Ore. . . H. J. Weber, AFS, "Legislation Affecting Foundries."

Philadelphia . . No Meeting.

Pittsburgh . . Sept. 16 . . Hotel Webster Hall, Pittsburgh, Pa.

Quad City . . Sept. 16 . . Fort Armstrong Hotel, Rock Island, Ill. . . H. Felten, Peoria Malleable Castings Co., "Pattern Equipment and Its Relation to Quality Control."

Rochester . . Sept. 7 . . Barnard's Firemens Association, Rochester, N.Y.

Saginaw Valley . . No Meeting.



news

St. Louis District . . Sept. 12 . . Edmond's Restaurant, St. Louis.

Southern California . . Sept. 13 . . Rodger Young Auditorium, Los Angeles . . H. J. Weber, AFS, "Legislation Affecting Foundries."

Tennessee . . No Meeting.

Texas . . Sept. 20 . . Ben Milam Hotel, Houston, Texas.

Texas . . San Antonio Section . . Sept. 23 . . Alamo Iron Works, San Antonio, Texas . . V. R. Lagaly, Standard Electrical Tool Co., "Modern Grinding Practices in Ferrous & Non-Ferrous Foundry."

Timberline . . Sept. 8 . . Schroeder Park, Denver, Colo. . . 1st Annual Picnic, Sept. 9 . . Oxford Hotel, Denver, Colo., Round Table.

Toledo . . No Meeting.

Tri-State . . Sept. 13 . . Alvin Hotel, Tulsa, Okla.

Twin City . . Sept. 10 . . Jax Restaurant, Minneapolis . . F. M. Scaggs, Oklahoma Steel Castings Co., Inc., "CO₂ Process."

Utah . . Sept. 23 . . Salt Lake City . . H. J. Weber, AFS, "Legislation Affecting Foundries."

Washington . . Sept. 19 . . Engineers' Club, Seattle . . H. J. Weber, AFS, "Legislation Affecting Foundries."

Western Michigan . . No Meeting.

Western New York . . No Meeting.

Wisconsin . . Sept. 13 . . Schroeder Hotel, Milwaukee.

OCTOBER

Michigan Regional Foundry Conference . . Oct. 2-3 . . Kellogg Center, Michigan State University, East Lansing, Mich. Sponsored by Central Michigan, Detroit, Saginaw Valley and Western Michigan Chapters of AFS, Michigan State University and University of Michigan Student Chapters.

Birmingham District . . Oct. 11 . . Thomas Jefferson Hotel, Birmingham, Ala. . . T. E. Eagan, Cooper-Bessemer Corp., "Nodular Iron."

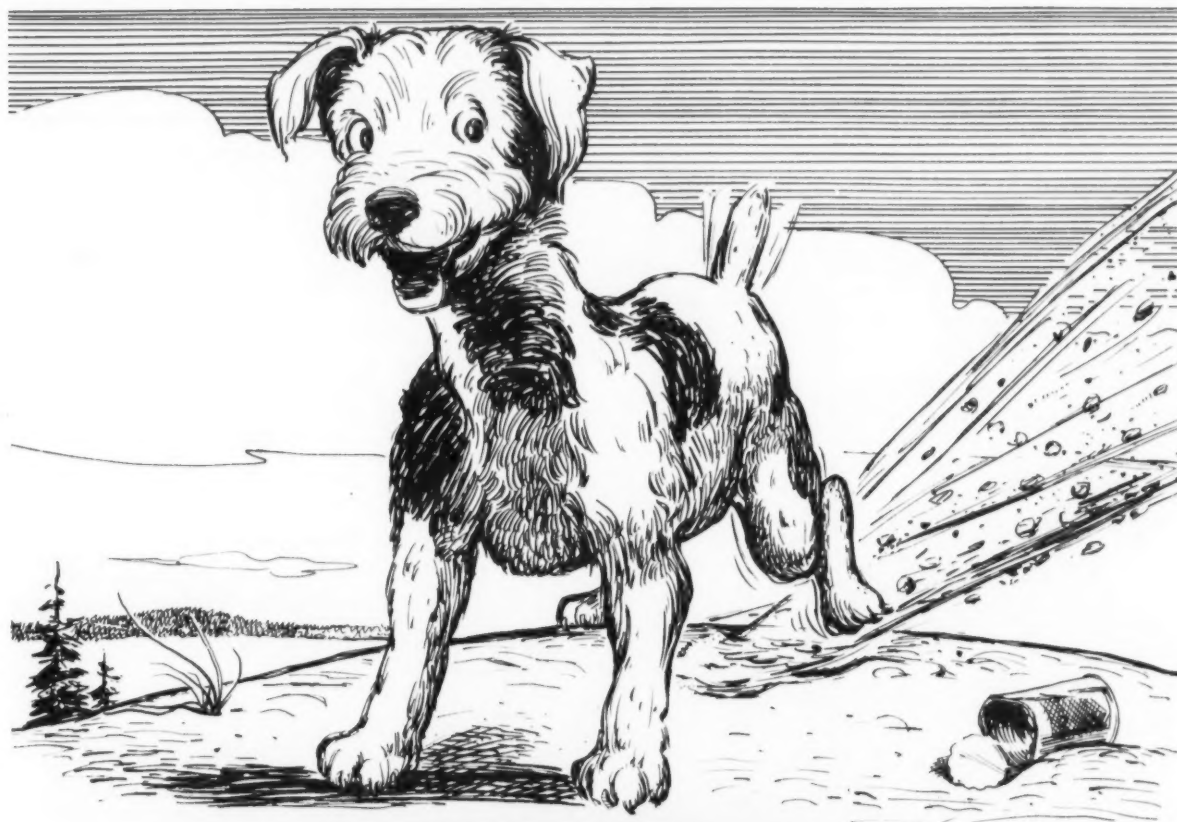
Canton District . . Oct. 3 . . Swiss Club, Canton, Ohio.

Central Illinois . . Oct. 7 . . American Legion Hall, Peoria, Ill.

Central Indiana . . Oct. 7 . . Athenaeum Turners, Indianapolis . . J. A. Gitzen, Delta Oil Products Co., "Mold & Core Sand Additives."

Central Michigan . . Oct. 16 . . Hart Hotel, Battle Creek, Mich.

Continued on page 64



Can your foundry afford to produce castings without properly **AERATED SAND**?

DO YOU WANT TO:

STOP LUMP TROUBLE?
CUT SCRAP LOSS?
SAVE ON MAINTENANCE?
GET INCREASED PERMEABILITY
AND BETTER FLOWABILITY?

Then call in Pekay and let us show you how to get the **BEST** aerated and blended foundry sand.

Don't worry about space and installation problems. The Pekay Airator can fit anywhere in your present system right on your conveyor belt without any alterations, because it's made to fit your conveyor frame.

Guaranteed customer satisfaction

Inquire today for more information and a list of Pekay Airator users.

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CHICAGO 22, ILLINOIS

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____ CITY AND STATE _____

Specialists in foundry sand conditioning and handling, slurry systems, engineering and equipment

I would like information on:

- ☐ Pekay Mixer Mullers ☐ Pekay Coolerator
☐ Pekay Sand Systems ☐ Pekay Airators
☐ Pekay M-T-Matic Buckets



news

Continued from page 63

Central New York . . Oct. 11 . . Mark Twain Hotel, Elmira, N.Y. . . Z. Madacey, Beardsley & Piper Div., Pettibone-Mulliken Corp., "Coremaking, Shooting and Blowing."

Chesapeake . . Oct. 25 . . Engineers'

Club, Baltimore, Md. . . D. J. Henry, Research Staff GMC, "Planning for 20th Century Foundry."

Chicago . . Oct. 7 . . Chicago Bar Association, Chicago . . G. DiSylvestro, Burnside Steel Foundry Co., "You Were There" and F. G. Steinebach, Penton Publishing Co., "Can We Sell More Castings?"

6 ways to improve foundry efficiency



...with J-M Transite Core Plates

Transite Core Plates are smoothly sanded, made of asbestos-cement, specially designed by Johns-Manville for holding cores during baking or drying. They give you all these important advantages:

1. **Simplify Handling**—their light weight speeds production.
2. **Reduce Replacement**—last for years . . . won't crack, break or delaminate in normal usage . . . won't rust, rot or corrode.
3. **Assure Accuracy**—their low warpage assures flat surface.
4. **Save Cleaning**—resist adhesion of sand and core wash.

5. **Minimize Fire Danger**—made from asbestos, Transite won't burn . . . helps lower insurance rates.
6. **Save Money**—cost less, last longer than many other materials. Cut to your requirements in sizes up to 48" x 60". Write for free sample and further information. Address Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

Photo courtesy
Palmyra Foundry Co.
Palmyra, New Jersey



Johns-Manville TRANSITE® AN ASBESTOS PRODUCT

Circle No. 154, Page 7-8

Cincinnati District . . Oct. 14 . . Hamilton, Ohio . . C. V. Nass, Beardsley & Piper Div. Pettibone-Mulliken Corp., "Mechanization in the Small Foundry."

Corn Belt . . Oct. 11 . . Cotner Terrace Cafe, Lincoln, Neb.

Detroit . . Oct. 17 . . Tuller Hotel, Detroit.

Metropolitan . . Oct. 7 . . Essex House, Newark, N. J. . . M. K. Young, United States Gypsum Co., "Epoxy Resin Patterns."

Mexico City . . Oct. 7 . . Mexico D. F., Mexico . . C. Adovasio, Cia Fundidora Del Norte, S. A., "Malleable Castings." Michiana . . Oct. 14 . . Tosi's, St. Joseph, Mich. . . H. J. Weber, AFS, "Legislation Affecting Foundries."

Mid-South . . Oct. 11 . . Claridge Hotel, Memphis, Tenn.

Northern California . . Oct. 14 . . Local Panel, "Shell Molding."

Northern Illinois & Southern Wisconsin . . Oct. 8 . . LaFayette Hotel, Rockford, Ill.

Philadelphia . . Oct. 18 . . Engineers' Club, Philadelphia.

Quad City . . Oct. 21 . . Fort Armstrong Hotel, Rock Island, Ill. . . W. Jennings, John Deere Waterloo Works, "Two Decades in Foundry and Manufacturing."

Rochester . . Oct. 1 . . Hotel Seneca, Rochester, N.Y. . . P. V. Lovette, Jr., Corning Glass Works, "Glascast."

Saginaw Valley . . Oct. 10 . . Fischer's Hotel, Frankenmuth, Mich.

Tennessee . . Oct. 18 . . Patten Hotel, Chattanooga, Tenn.

Texas . . Oct. 18 . . Menger Hotel, San Antonio, Texas.

Toledo . . Oct. 2 . . Heather Downs Country Club, Toledo, Ohio.

Tri-State . . Oct. 18 . . Wilder's Cafe, Joplin, Mo. . . "Steel."

Twin City . . Oct. 8 . . Minneapolis . . W. Ball, Jr., R. Lavin & Sons, Inc., "Human Engineering."

New England Regional Foundry Conference . . Oct. 18-19 . . Massachusetts Institute of Technology, Cambridge, Mass. Sponsored by New England and Connecticut Chapters of AFS.

Utah . . Oct. 23 . . Provo, Utah.

Niagara Frontier Regional Foundry Conference . . Oct. 24-25 . . Hotel Statler, Buffalo, N.Y. Sponsored by Western New York, Central New York, Eastern New

York, Northwestern Pennsylvania, Ontario and Rochester Chapters of AFS.

Northwest Regional Foundry Conference . . Oct. 18-19 . . Hotel Vancouver, Vancouver, B.C. Sponsored by Oregon, Washington and British Columbia Chapters of AFS and Oregon State College Student Chapter.

Western Michigan . . Oct. 7.

Western New York . . Oct. 4 . . Sheraton Hotel, Buffalo, N.Y.

10th Annual Purdue Metals Casting Conference . . Oct. 31-Nov. 1 . . Purdue University, Lafayette, Ind. Sponsored by Central Indiana and Michiana Chapters of AFS and Purdue University Student Chapter.



committees in action

■ An evaluation of research tests on the degree of penetration by aluminum, brass, and iron under three separate degrees of superheat was presented at the May meeting of the Sand Division Mold Surface Committee in Cincinnati.

These tests were made at the laboratories of Michigan State University, East Lansing, Mich. Committee members assigned values from 0 to 9 for casting finish. The committee voted to accept this classification of penetration as presented.

As to when penetration takes place during metal solidification, it was suggested that the chemical analysis of penetrating metal and the liquid phase diagram be compared.

Assignments were made relative to the M.S.U. research tests:

■ C. C. Sigerfoos and G. J. Vingas were appointed to study new gating for the old test.

■ J. A. Ridderhof and J. B. Caine were asked to study surface finish and existing data.

Steel castings will be made this summer by G. J. Vingas and C. J. Schwetz for study by the committee. Molds of lead and Wood's metal will be made and cast at the fall meeting of the committee to be held in November at Ohio State University, Columbus, Ohio.

AFS Chapters Elect

■ New officers have been elected recently by many of the chapters of the

American Foundrymen's Society, included in these are the following:

Chesapeake Chapter

Chairman, Donald A. Roemer, Franklin-Balmer Corp.
Vice-Chairman, W. O. Becker, Atlantic Abrasive Co.
Secretary, W. S. Crisp, Gibson & Kirk Co.
Treasurer, Henry M. Witmyer, Foundry Service & Supply Co.
Directors, W. H. Baer, Bureau of Ships, Dept. of Navy.
 Edward Hartman, Pangborn, Corp.
Membership, S. Donald D'Alfonzo, American Metaseal Corp.

Wisconsin Chapter

President, Norman N. Amrhein, Federal Malleable Co.
Vice-President, Leslie J. Woehlke, Grede Foundries, Inc.
Secretary, L. J. Andres, Lawran Foundry Co.
Treasurer, Bradley H. Booth, Carpenter Bros., Inc.
Directors, Ralph J. Vandenheuvel, Milwaukee Chaplet & Mfg. Co.
 Charles Zahn, Vilter Mfg. Co.
Membership, William A. Thompson, Milwaukee Chaplet & Supply Co.
 William A. Mehner, Charles A. Krause Milling Co.

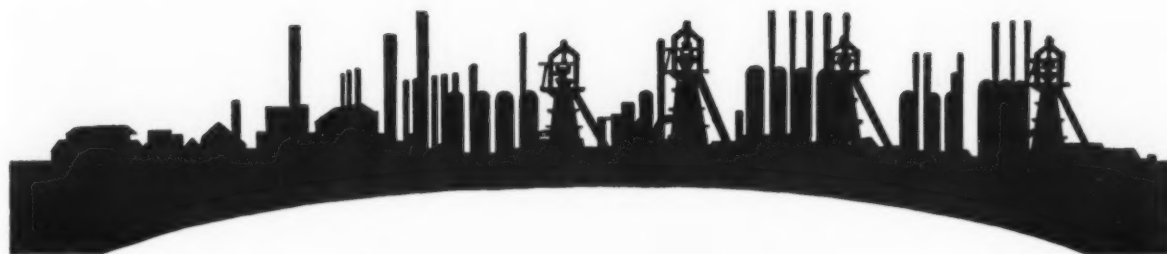
**Northern Illinois-
Southern Wisconsin Chapter**

Chairman, H. M. Bacon, Beloit Foundry Co.
Vice-Chairman, A. P. Volkmar, Gunitite Foundries, Corp.
Secretary, Lyle Fulton, George D. Roper Corp.
Treasurer, John F. Carberry, Gunitite Foundries Corp.
Directors, D. B. DeJohn, Gunitite Foundries Corp.
 Richard A. Oster, Beloit Vocational & Adult School.
 Harry V. Rossi, Ebaloy Foundries Corp.
Membership, Ralph M. Lightcap, Rupp Pattern Co.
 Robert J. Bennett, Beloit Iron Works.

Central New York Chapter

Chairman, N. W. Meloon, Jr., Meloon Bronze Foundry, Inc.
Vice-Chairman, Ralph J. Denton, R. J. Denton Co., Inc.
Secretary, Bruce R. Artz, Pangborn Corp.
Treasurer, Robert P. Watson, Chicago Pneumatic Tool Co.
Directors, J. T. Coggin, General Electric Co.
 C. H. Meister, Jardine Bronze Foundry, Inc.

Continued on page 66



Always a *MUST* at **WOODWARD** *Uniform* *Quality Pig Iron*

At all times—under all conditions—Woodward has consistently maintained the uniform character and quality of its merchant iron. That's why Woodward iron commands universal confidence throughout the nation's foundry trade.

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 Phone Bessemer, Ala. 5-2491
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HICKMAN, WILLIAMS & COMPANY with Sales Branches at—

609 Bona Allen Building, Atlanta 3, Ga.; 230 North Michigan Avenue, Chicago 1, Ill.; First National Building, P. O. Box 338, Cincinnati 1, Ohio; 1659 Union Commerce Building, Cleveland 14, Ohio; 1203 Ford Bldg., Detroit 26, Mich.; P. O.

Box 335, Duluth 1, Minn.; 412 Guaranty Bldg., Indianapolis 4, Ind.; 70 Pine St., New York 5, N. Y.; 1500 Walnut Street Bldg., Philadelphia 2, Pa.; 1910 Clark Bldg., Pittsburgh 22, Pa.; 902 Syndicate Trust Bldg., St. Louis 1, Mo.

Woodward Iron Company

WOODWARD, ALABAMA

Independent Since 1882





news

Continued from page 65

E. C. Kime, Hallstead Iron Foundry Co.
Membership, **Francis H. Troy**, F. P. Shortleeve Co.

Mid-South Chapter

Chairman, **E. J. Johnson**, International Harvester Co.

Vice-President, **M. B. Parker, Sr.**, M. B. Parker Co.

Secretary-Treasurer, **J. R. Karlovic**, Standard Brake Shoe & Foundry Co.

Directors, **J. H. Warner**, J. H. Warner & Co.
B. C. Wilkes, Layne & Bowler, Inc.

Membership, **Thomas W. Bant**, International Harvester Co.

BRASS AND BRONZE

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Standard For The Industry
For Over Half-A-Century

Any Specifications
Special Alloys

Prompt Delivery

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Chicago Heights, Illinois
Offices in Principal Cities

Mo-Kan Chapter

Chairman, **Thomas F. Shadwick**, Witte Engine Works Div., Oil Well Supply Co.

Vice-Chairman, **Harlan George Joseph**, St. Louis Coke & Foundry Supply Co.

Secretary, **Howard Julian**, Blue Valley Foundry.

Treasurer, **H. P. Schwickrath**, Prier Brass Mfg. Co.

Director, **E. F. Whitfill**, Acme Pattern Works.

Membership, **Lloyd Canfield**, Canfield Foundry Supplies & Equipment.

Tennessee Chapter

Chairman, **G. Frank Anderson**, Tennessee Products & Chemical Corp.

Vice-Chairman, **W. L. Austin**, U.S. Pipe & Foundry Co.

Secretary, **J. E. Abshire, Jr.**, Ross-Mehan Foundries.

Directors, **Coy E. Jones**, Muller Co.
Charles E. Seman, Crane Co.
Charles E. Seman, Crane Co.

Membership, **James D. Martin**, Combustion Engineering Co.

Toledo Chapter

Chairman, **Martin J. Grehler**, Unitcast Corp.

Vice-Chairman, **Richard E. Bossert**, Maumee Malleable Castings Co.

Secretary, **LeRoy F. Schultz**, Freeman Supply Co.

Treasurer, **Roy C. Ensign**, Ensign Foundry Co.

Directors, **George Gaynor**, Maumee Malleable Castings Co.

Cloyce W. Taylor, Alloy Founders, Inc.

Don J. Catron, Freeman Supply Co.

Walter Barnhart, E. W. Bliss Co.

William Weaver, Modern Pattern & Plastics Co.

Utah Chapter

Chairman, **Arthur S. Klopff**, American Gilsonite Co.

1st Vice-Chairman, **Claud C. Cardall**, Pacific States Cast Iron Pipe Co.

2d Vice-Chairman, **Donald N. Rosenblatt**, American Foundry & Machine Co.

Secretary, **L. C. Skelton**, Columbia-Geneva Steel Div., U.S. Steel Corp.

Treasurer, **Fred Hafen**, Pacific States Cast Iron Pipe Co.

Directors, **William W. Brown**, Pacific States Cast Iron Pipe Co.

Jack W. Carter, American Foundry & Machine Co.

Membership, **L. C. Skelton**.

Gray Iron Alloy Characteristics at 700-1000

■ Cast iron alloys are suitable for load-carrying applications at 800 F but not for support of appreciable loads for long periods at 1000 F.

This result is one of several listed in a research progress report on properties of cast iron at elevated temperatures, sponsored by the American Society for Testing Materials-American Society of Mechanical Engineers joint committee on the effect of temperature on properties of metals. The objective is to determine the suitability of cast iron alloys at 700-1000 F.

Seven plain and low-alloy cast irons selected for creep-rupture tests and thermal shock-tests are: (1) molybdenum-alloyed, pearlitic gray iron; (2) nickel-molybdenum-alloyed, pearlitic gray iron; (3) chromium-alloyed gray iron with a matrix of 50 per cent pearlite and 50 per cent ferrite; (4) unalloyed, ferritic nodular iron; (5) chrome-nickel-molybdenum-alloyed, pearlitic gray iron; (6) unalloyed, pearlitic gray iron; and (7) chrome-moly-alloyed, pearlitic gray iron.

Alloying has a marked effect on the creep-rupture properties of cast iron. Among the alloying elements tested, molybdenum is the most potent for improving these properties. The chrome-moly iron had the best properties of all the alloys tested, but chromium additions alone were not beneficial to creep-rupture properties. The chrome-moly iron had creep-rupture properties intermediate to those of a hot-rolled carbon-moly steel and a hot-rolled low-carbon steel. All the other irons were inferior to the low-carbon steel, in creep-rupture properties, although the chrome-nickel-moly-vanadium iron approached it closely. The unalloyed ferritic nodular iron was slightly superior to the unalloyed pearlitic gray iron.

The unalloyed ferritic nodular iron was far superior in thermal-shock resistance to any of the gray irons that were tested. Small additions of molybdenum and nickel improved the thermal-shock resistance of gray iron.

MORE FACTS on all products, literature, and services shown in the advertisements and listed in Products & Processes and in For the Asking can be obtained by using the handy Reader Service cards, pages 7-8.

Let's Get Personal

continued from page 15

M. Sellers, formerly manager of the Auto-Lite Fostoria, Ohio foundry, has been named sales manager. Both will report to division general manager W. J. Valter.

Howard J. Williams . . sales manager, New Jersey Silica Sand Co., Millville, N. J., has retired. Mr. Williams



H. J. Williams

has been active in several activities and served for many years on AFS Sand Division committees.

N. G. Hayek . . has been named manager of the newly established Zurich, Switzerland, branch of the Knight Engineering Establishment,



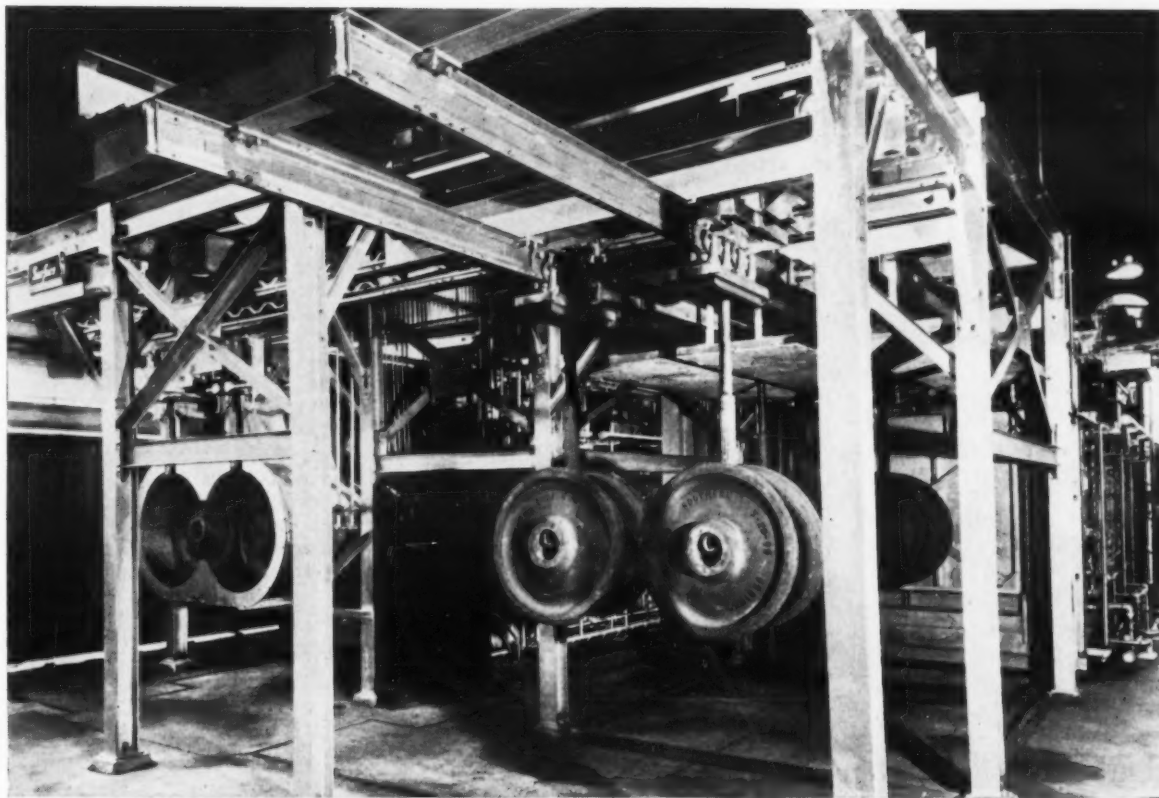
N. G. Hayek

Vaduz, Liechtenstein. This European consulting engineering group is affiliated with Lester B. Knight & Associates, Chicago.

W. K. Abbott . . has transferred from the ferrous castings section of the International Nickel Co.'s Bayonne

I. W. Peterson . . has been appointed Detroit district manager of Norton Co.'s Grinding Machine Div.

continued on page 75



Wheels are transported in sets of 4 by overhead American MonoRail thru heat treating operation.



American MonoRail deposits red-hot wheels in insulated pits.

Railroad car wheels travel by **AMERICAN MONORAIL** - get heat treated while aboard

The first ride these wheels ever take is aboard an American MonoRail which expresses them red-hot to insulated pits where they cool slowly for 5½ hours.

After removal from the pits by MonoRail crane, the wheels are loaded in sets of 4 on MonoRail hangers which transport them thru two furnaces for double heat treating.

Experienced MonoRail engineers will tailor-make a cost-saving handling system from standard parts to fit your specific needs.

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Bulletin C-1.**

Member of Materials Handling Institute and MonoRail Manufacturers' Association.
For Power Driven Conveyors, Use Landahl Chainless Conveyors

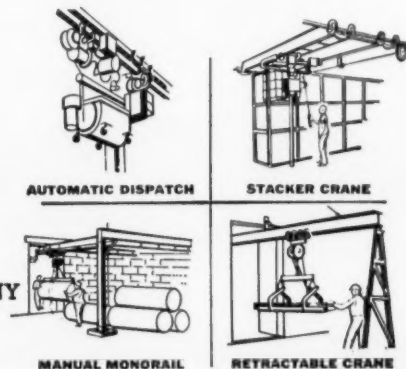


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MONORAIL COMPANY

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(IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.)

Circle No. 157, Page 7-8



**CASTABILITY...
Hardenability
High Conductivity...**

**ONLY IN
*Beryllium
Copper*
CASTING ALLOYS**

**HIGHEST STRENGTH
with MODERATE
CONDUCTIVITY**

250-C
Be . . 2.60-2.85%
Co . . 0.35-0.65%
Cu . . balance

200-C
Be . . 2.00-2.25%
Co . . 0.35-0.65%
Cu . . balance

BRUSH Alloys 250-C and 200-C can be hardened to the strength of steel (155,000 to 180,000 psi Tensile) by simple heat treatment, while maintaining 20% to 25% of the thermal and electrical conductivity of pure copper. **USEFUL FOR:** molds, bearings, gears, cams, valves, pumps, plungers, drawing dies, flash welder dies and other high strength and wear resistant parts.

HIGH CONDUCTIVITY with HIGH STRENGTH

BRUSH Alloys 55-C and 35-C are specified where highest thermal and electrical conductivity are required. By combining 45% to 50% of copper's conductivity with high strength (95,000 to 120,000 psi Tensile), these alloys find application in: switch and circuit breaker contacts, welding electrodes, slip rings and contact arms, and parts in which conductivity and strength at elevated temperature are vital.

55-C
Be . . 0.55-0.75%
Co . . 2.40-2.60%
Cu . . balance

35-C
Be . . 0.25-0.50%
Ni . . 1.40-1.60%
Cu . . balance

Brush Beryllium

BERYLLIUM COPPER CASTING ALLOYS
BeCu

BERYLLIUM METAL
BERYLLIUM COPPER
BERYLLIUM MASTER ALLOYS
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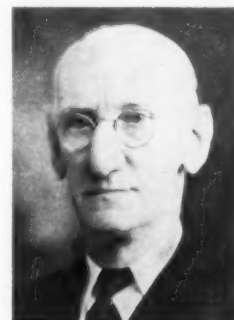
Circle No. 158, Page 7-8



obituaries

Benjamin D. Fuller, past president of AFS, died July 5 at his home in Rocky River, Ohio, after a two-year illness. He was unable to attend the last two AFS Conventions, the first he had missed in many years. His death, at the age of 93, removed the oldest living past president of AFS.

Born in Scituate, Mass., Mr. Fuller served his apprenticeship in the foundry of the Pittsburgh Locomotive Works and for 30 years thereafter was associated with Westinghouse Electric Co. as molder, progressing to foreman, superintendent, and then



B. D. Fuller

foundry manager.

After six years as vice-president and manager of Defiance Paper Co. and Niagara Wall Paper Co., he joined Whitehead Bros. as sales representative, traveling extensively for them, helping foundrymen wherever he went and making many friends throughout the industry. He was respected for his integrity and admired for his personal traits of kindness, helpfulness and never-failing good humor.

A long-time member of AFS, Benjamin Fuller served as president in 1917-18 and also on committees. He was a member of the American Society of Mechanical Engineers for several years and the author of several papers on foundry subjects published in the technical press.

Kershaw Harms, 58, vice-president of American Smelting & Refining Co., New York, died suddenly July 12. An employee of the company for 40 years, he became general manager of the Federated Metals Division in 1954 and was appointed vice-presi-

dent in charge of the division in April of 1957.

Edward J. Bothwell, 57, in charge of the distributor sales section of the Nickel Sales Department of The International Nickel Co., Inc., New York died July 24 after a brief illness. He joined the company in 1915.

A native and life-long resident of Staten Island, Mr. Bothwell served with the Tank Corps of the United States Army in World War I. He was a member of the American Foundrymen's Society, American Society for Metals, and chairman of the advertising and sales promotion committee of Gray Iron Founders' Society 1946-1956.

Walter C. Kerrigan, 65, assistant to the president of The International Nickel Co. of Canada, Ltd. and its subsidiary, The International Nickel Co., Inc., died July 16 after an illness of several months. He joined the Nickel sales department in 1930, becoming manager of that department in 1946. He was named vice-president of the company in 1947, becoming assistant to the president in 1954.

Mr. Kerrigan attended Rutgers University and Columbia University. He served with the United States Navy in World War I. He was a member of the American Institute of Mining & Metallurgical Engineers and the Mining Club of New York.

Russell Duer, 58, district sales manager, Wheelabrator Corp., Mishawaka, Ind., died July 4. Associated with the company since 1928, he became manager of the Cincinnati territory in 1939. He was a member of the Cincinnati Chapter of AFS.

Roger Williams Straus, 65, retired board chairman of American Smelting & Refining Co., died suddenly July 28. He joined the company in 1914 and rose to the presidency in 1941, serving in that capacity until 1947. At the time of his death he was director of A.S. & R. Co., Revere Copper and Brass, Inc., General Cable Corp., New York Life Insurance Co. and New York Telephone Co.

Mr. Straus was made Chancellor, Board of Regents, State of New York, in April, 1957. He served as a member of the U.S. delegation to the 9th General Assembly of the United Nations in 1955 and during World War I served in Military Intelligence.

Mr. Straus was known internationally for his work in the National Conference of Christians and Jews, as well as many other national organizations, including Boy Scouts of America.

new books

Cast Metals Handbook . . 4th ed. 316 pp. American Foundrymen's Society, Golf and Wolf Rds., Des Plaines, Ill. 1957. AFS members \$7; others \$10.

The first revision of this book since 1944 gives information which will be of value to all producers and users of castings. There are six sections which are divided as follows: I-General; II-Gray and White Cast Irons; III-Malleable Cast Iron; IV-Nodular Cast Iron; V-Steel Castings; VI-Non-ferrous Alloys. The first section describes the advantages of castings, general properties of cast metals, casting design, pattern equipment, cost estimation, specifications, list of technical societies and trade associations, mechanical testing, molding and inspection methods. The last five sections each have chapters giving general information, metallurgy, methods of manufacture, properties, applications and a bibliography on the specific type of metal. The manuscript was prepared by a committee comprised of outstanding authorities in the various fields of the metal casting industry.

Machining and Grinding . . Norman Zlatin and Charles F. Walton. 57 pp. Gray Iron Founders' Society, Inc., 930 National City-East 6th Bldg., Cleveland 14, 1957. GIFS members \$1; others \$3.

Information is presented on the application of machining and grinding operations on gray cast iron. Graphs, photographs, and a bibliography are included.

Investment Casting Engineering and Design Manual . . 50 pp. Investment Casting Institute, 27 E. Monroe St., Chicago 3, 1957. \$5.

History, advantages, and limitations of process are presented. A brief description of the process is included, but the principal content is devoted to design and metal specifications. Ferrous and non-ferrous alloys recommended for the process are listed.

The Fabrication and Properties of Alfenol Alloys Containing 10 to 17 Per Cent Aluminum . . J. F. Nachman and W. J. Buehler. 19 pp. PB 111552S Office of Technical Services, U.S. Dept. of Commerce, Washington 25, D.C. 1955. \$0.75.

Magnetic data are given for laminated cores of Alfenol varying in aluminum content from 10 to 17 per cent, remainder iron. The report describes improved methods of fabrication by melting and casting to obtain a fine equiaxed cast grain structure. Such pertinent metallurgical data as tensile properties, hardness, recrystallization temperatures, machinability, and sheet fabrication characteristics are presented. Studies indicate that these alloys are potential substitutes for

Continued on page 70

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Circle No. 160, Page 7-8

70 • modern castings

New Books

Continued from page 69

many magnetic alloys containing strategic elements. An earlier report, PB 111-552, *The Fabrication and Properties of 16-Alfenol* . . . 1953, 27 pp, 75 cents is also available from OTS.

Cast Copper Anti-Friction Steel . . A. A. Lunev. 10 pp. PB 121364, Office of Technical Services, U.S. Dept. of Commerce, Washington 25, D.C. 1955. \$0.50.

This translation from the Russian periodical *Liteneoe Proizvodstvo* discusses the development of copper anti-friction steels for use in casting machine parts, an application which had received little previous investigation because steel and copper are subject to liquation. The alloys were stabilized during melting and casting by addition of aluminum. Admixtures of lead reduced the coefficient of friction, improved machinability, and did not affect good wearability of copper-aluminum steel. One type of cast copper anti-friction steel, tested in casting axle bearings and separator rings of ball bearings, is recommended in the report for wide industrial use instead of brass and bronze. Another copper-aluminum steel is recommended to replace metal-ceramic materials in the manufacture of heavy-duty and large-scale parts difficult to produce by powder metallurgy methods.

Bibliography of the Material Damping Field . . L. J. Demer. 100 pp. PB 121-437. Office Of Technical Services, U.S. Dept. of Commerce, Washington 25, D.C. 1956. \$2.75.

This bibliography contains 900 entries, beginning with a report of research in 1784. Abstracts are included in all except a few cases. The arrangement is chronological. A detailed classification system similar to the ASM-SLA Metallurgical Literature Classification is described. Punch card codings are included with each reference.

Investment Casting Institute On Second Printing of Manual

■ More than 8,000 copies of the Engineering and Design Manual published by the Investment Casting Institute have been sold; and a second printing of the book has been announced.

The publication includes rules governing design, dimensional tolerances and shapes, surface finish, and other data for the designer, metallurgist, and purchasing agent dealing with investment castings.

H. P. Dolan, executive director of the organization, states that sales of the book are expected to total 20,000 within one year of its publication date.

Copies may be ordered from the Investment Casting Institute, 27 E. Monroe St., Chicago 3.



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Circle No. 162, Page 7-8

questions and answers

Misery loves company so why not share your castings problems with us? MODERN CASTINGS invites you to "stump the experts" with tales of gremlins that are haunting your scrap piles. If any of you readers have better answers to the questions below, write the editor.

slag appearance

Q. What is the significance of cupola slag appearance?

A. The color and appearance of slag coming from the cupola is an excellent indicator of melting conditions in the cupola and quality of iron being tapped. Good melting practices are indicated by a green, solid, glassy appearing slag. A glassy slag colored light brown with a yellow tinge may show good melting practice but manganese is on the high side. If slag is deep brown to black and solid, very large quantities of iron oxide are probably present. A black-brownish or frothy slag indicates excessive oxidation.

Excess lime in the charge is revealed by a white slag. A purple-to-black colored slag with a solid fracture denotes high sulphur or that the slag has been de-sulphurized. If air blast is too high, metal shot will begin to appear in the slag.



strainer cores

Q. How are ceramic strainer cores used in the foundry?

A. Ceramic strainer cores are used to meter the delivery of molten metal into the casting cavity. They are usually circular discs of varying diameters to suit the size of the sprue being used in the mold. The discs have a number of holes through them. The size and number of holes depend on the metal and rate of

flow desired. Strainer cores are usually placed near the bottom of the sprue to act as a choke in the system. Besides controlling the rate of metal flow the core acts as a strainer preventing sand and slag from entering the mold cavity. A paper entitled "Designing Strainer Cores" appears in volume 56 (1948) of the AFS TRANSACTIONS.



nodular iron fumes

Q. Is it dangerous to breathe the fumes generated when magnesium is added to molten cast iron?

A. When magnesium is added to cast iron, a large volume of smoke containing finely divided oxides of magnesium is evolved. Magnesium oxides are not considered poisonous but are capable of causing metal fume fever. This is a malaria-like illness which causes no permanent disability and is never fatal. Inhalation by foundry workers may also cause headaches. The maximum allowable concentration of these oxides is 15 milligrams per cubic meter of air. This is approximately 150 times the allowable concentration for lead oxide. The use of an exhaust system in the area of magnesium inoculation is recommended.

A satisfactory method is illustrated in Section 5 of the AFS ENGINEERING MANUAL FOR CONTROL OF IN-PLANT ENVIRONMENT IN FOUNDRIES. An alternative suggestion would be the wearing of respirators by the men working in the vicinity of high smoke concentration. At least one foundry has reduced the quantity of smoke generated by partially covering the ladle and maintaining an inert atmosphere of argon over the molten metal during inoculation.

joining bronze

Q. What are the recommended joining techniques for a high leaded tin bronze analyzing 83% Cu-7% Pb-7%

Sn-3% Zn?

A. This alloy responds excellently to any soft soldering operations. However, high leaded tin bronze is not considered suitable for silver soldering, brazing, or any form of welding except spot welding. The high temperatures involved in joining by these techniques causes the lead to sweat out of the alloy, damaging its physical properties.

hard stainless

Q. We have been water quenching

our 18-8 stainless steel castings from 2000 F. The castings are coming out with a 250-300 Bhn which is much too high. How can we get the desired 180-200 Bhn level?

A. Evidently the carbon content of your stainless steel is too high causing the precipitation of carbides, as the so-called "sigma" phase. The carbon content of the melt should be controlled to a maximum of about 0.10 to 0.12 per cent. Addition of 0.20% Mo will further help prevent this undesirable hardness.

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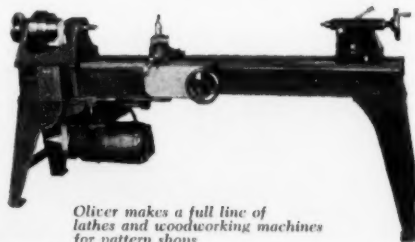
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72 • modern castings



dietrich's corner

by h. f. dietrich

When we call Andrew Carnegie "King of the Vulcans," we pay tribute to the organizational ability that built a steel empire. To us, he seems a hard, ruthless exploiter of men. But there is another side to the eventful life of this diminutive supsalesman. If he was hard, it was because he had to be to exist in a world of two fisted industrial pioneers. All frontiers are ruled by the law of the jungle, and the hard-eyed, cocky, quick thinking Carnegie held his own.

Unlike the despicable characters, Drew, Gould, and Fisk, who would sell their mother's souls for gold, Andy felt that his ability should be used to improve the culture of the world. Like many idealists, the environment in which he lived prevented his total fulfillment of this high ideal. He was ahead of his time.

Drew was illiterate and did nothing in his lifetime to improve. His only objective was to get the best of a sharp deal. Gould and Fisk could read, but they confined their reading ability to the obituary notices of the companies they had killed. This enabled them to be on hand to pick the bones of the defunct business. Watered stock and a rigged market were the specialty of all three. Carnegie, on the other hand, tried to build a business on a sound foundation. He dealt in tangible goods, and believed in giving value for money received.

We must remember that this was in a day when power and wreckless virility were the criteria by which men were judged. If anyone suggested goggles while pouring a heat, he would be laughed at and considered a pantywaist. If you couldn't lift a thirty inch cope by yourself, you were something less than a man. Many a vertebra disc was ruptured by looping a rope around a molder's neck and tying the ends of the rope to the handles of a flask. By bridging against the rope while lifting the opposite handles with his hands, a molder could lift a cope. Then, by twisting his back, he could set the cope on edge.

Arbitration was done in this primitive society with clubs, bricks, knives, and Winchesters. A modern foreman thrown into a work crew of those

days wouldn't last long enough to draw his first day's pay.

With goon gangs legal, and for hire, it was no wonder that Carnegie used them when he felt the need. If he didn't, someone else would. It was a way of life of the time. The stubborn, goat-bearded Scotsman could use his unusual personal charm when that would accomplish his ends, but he was not adverse to the use of more forceful means when necessary to perpetuate his autocracy.

In his youth Andy was idealistic. At age 33 he noted in his credo, "... and (have) an income of \$50,000 per annum! Beyond this never earn." "... take part in public affairs, especially those connected with education and improvement of the poorer classes ..." "Will resign business at thirty-five."¹

Somewhere along the line most of this credo was scrapped. Perhaps the building of an empire became an obsession, and he continued his struggle for power for another thirty-two years. He forgot that he wanted an Oxford education, and that he wanted to meet literary men.

In 1900, Gates and J. P. Morgan tried to squeeze Andy out of the iron game. But the little supsalesman played one more hand before retiring. By astute propaganda in the right places, he played a bluff that forced Morgan to call his hand. Instead of being squeezed out of the business, he sold out for a reputed \$492 million, and spent the next 18 years trying to get rid of his share.

Carnegie built the Peace Palace at The Hague, donated \$20 million to American universities, \$10 million to Scottish universities, and provided pension funds for the widows of Presidents Cleveland and Roosevelt. In all, his benefactions totaled \$350 million. He died in 1919 with only 10% of his fortune left. Of one thing we can be certain, Andrew Carnegie left this world with the same amount of money with which he entered.

During his career, Little Andy never poured a ladle of iron. But who would expect it of the King of the Vulcans?

¹The Age of the Moguls, Stewart H. Holbrook

foundry facts

Tensile Test for Resin-Coated Sand

AFS Tentative Standard

Tensile Test for Resin-Coated Sand

This procedure was developed by
Shell Molding Materials Testing Committee (8-N)
 Sand Division, American Foundrymen's Society

Since resin-coated sands are used primarily in blowing operations, it is considered that in order to be representative of the coated sand at the time of usage, tensile specimens should be prepared by blowing, similar to the blowing of shell cores and shell molds.

The basis of all sand testing is to evaluate the properties of the sand used in the foundry and to correlate the casting results with these properties. Sand testing is done chiefly for control

purposes. If the foundry had perfect control of resin-coated sands, it would still be necessary to test them occasionally, once standards had been established. It is, therefore, the object of this test to provide a means of evaluating production coated sands on a day-to-day, hour-to-hour basis.

If a testing procedure is to indicate the variations in coated sand from one batch to another, the procedure itself must be reproducible to a high degree. The reproducibility of a testing procedure depends to a great extent upon the test equipment. Therefore, deviations from this procedure are encouraged to suit the individual laboratory equipment to obtain maximum reproducibility. Reproducibility of test results is more important than duplicating the production conditions in a test procedure.

Specimen Used

Test specimens shall be of the standard AFS tensile briquette shape having 0.250 ± 0.010 in. thickness. These specimens should be made from samples of the production resin-coated sand to be evaluated.

Test Equipment

1. A three (3) part metal pattern is used. A three (3) cavity pattern for an AFS tensile briquette specimen of 0.250 in. thickness is commercially avail-

able. The dimensions of the briquette specimen are detailed on page 141 of the **Foundry Sand Handbook**, Sixth Edition.

2. The blowing rig may be a commercially available small coreblower or any regulated and controllable compressed air supply.

3. A cartridge modified to blow coated sand into the specimen pattern is shown in Fig. 1. This is a commercially available cartridge to which has been attached a 1/4 in. steel plate. To resist sand leakage through the blowholes, copper tubing approximately 1/2 in. long has been depressed into the cartridge through the plate as illustrated.

4. An alternate modification employs the use of a slit rubber gasket covering the blowholes, without use of the tubing.

5. Air leakage between pattern pieces usually provides sufficient venting. If more is required, scratch vents may be added on the blowplate extending outward from the wide portions of the specimens.

6. Suitable jigs will facilitate positioning the cartridge over the specimen pattern.

7. An oven attaining a temperature of at least 470 F is required. Since the curing cycle for a shell mold specimen is comparatively short, the test oven must have a rapid heat recovery to insure curing the specimen at the proper temperature.

8. The specimens can be broken on any suitable tensile testing machine with jaws designed to eliminate a notch effect.

Preparing Test Specimen

1. The pattern should be at a temperature of 400 ± 10 F when blown with the resin-coated sand. This should be accomplished by overheating it approximately 25 F and letting it cool to

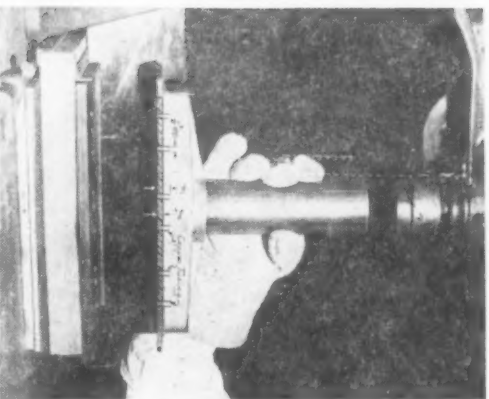


Fig. 1 . . . Cartridge modified for use in preparation of sample for test.

General Electric Co., Photos

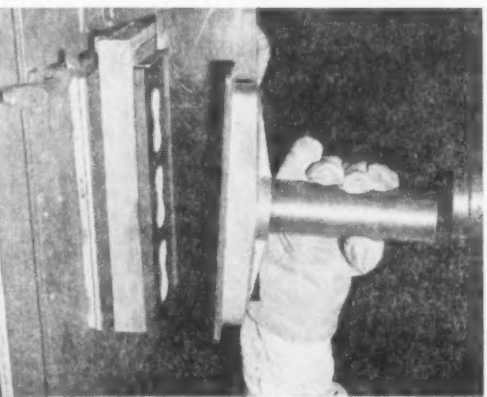


Fig. 2 . . . Removing cartridge after the test briquette has been blown.

General Electric Co., Photos

400 F. The temperature is to be measured on the bottom plate. On removal from the oven, the pattern assembly should be placed on insulating material to prevent excessive and uneven heat loss during cooling.

2. Pattern surface should be treated with release agent only if one is used in the production operation.

3. A flat plate should be positioned under the cartridge so that all the blowholes are covered. The resin-coated sand to be tested should be placed inside the cartridge.

4. Place the cartridge and plate in the blowing position and apply air pressure for a few seconds. This will pack the sand uniformly within the cartridge and prevent leakage from the blowholes. This step is necessary for only the first set of specimens blown.

5. Remove flat plate, position pattern (at correct temperature), wipe bottom of cartridge to remove sand particles and re-position over pattern for blowing.

6. Apply air pressure at 30 psi for 2 seconds and remove cartridge as shown in Fig. 2. *Note: Positioning and blowing of the specimens should be accomplished in as short an interval as possible to prevent an excessive temperature drop in the pattern.*

7. The pattern filled with sand is placed in the oven at a predetermined

temperature for a given time, for example, $475\text{ F} \pm 10\text{ F}$ for a curing time of 4 minutes. Proper curing of the sample is achieved when the color is uniform on top and bottom surfaces.

Specified time and temperature may not be satisfactory for all types of equipment. Therefore, a curve of curing time vs. tensile strength should be plotted at optimum oven temperature. A curing time along the least slope portion of the curve should be used.

8. Specimens are to be cooled to room temperature before testing.

Testing Specimens

1. Six (6) specimens constitute a test on one (1) sample.

2. Specimens having surface imperfections are not to be included in the test.

3. The specimens should be fitted in the jaws of the tensile machine in such a manner that they are gripped uniformly along the lateral surfaces and so that the load is applied along a line through their axes.

4. Record the breaking load in pounds and calculate the tensile strength in pounds per square inch for each specimen.

5. The recorded tensile strength value for the sample should be the average of the tensile strength in pounds per square inch of the six (6) specimens.

Members of Committee 8-N

Nicholas Sheptak, *chairman*; J. E. Bolt, *vice-chairman*; G. I. Reynolds, *secretary*; G. E. Ceebin; W. H. Dunn; G. M. Etherington; A. L. Graham; F. W. Less; R. E. Melcher; R. J. Miller; R. J. Mulligan; R. A. Rabe; J. B. Smilie; Lee Stark; E. I. Valyi.

AFS Tentative Standard Determination of Loss on Ignition of Resin-Sand Mixture

This procedure was developed by
Shell Molding Materials Testing Committee (8-N)
Sand Division, American Foundrymen's Society

The object of this test is to determine the loss-on-ignition content of resin-sand mixtures. Since any organic or volatile material present in the resin-sand mixtures would become part of the per cent loss-on-ignition, this test cannot be designated as a true resin content test. The intent of this testing procedure is to provide a control test to indicate resin content.

accuracy and reproducibility. Larger samples require a longer burn-off time.

4. Heat at 1750 F (955 C) in a muffle furnace until constant weight is attained. One hour is usually sufficient for a 5 gm sample.

5. Cool sample in a desiccator to room temperature.

6. Accurately reweigh sample.

7. Loss in Weight

$\frac{\text{Weight of Sample}}{\text{Loss in Weight}} \times 100 =$

% Loss on Ignition

Any organic materials, other than resin, which have been added to the mixtures will be ignited during the test and will become part of the per cent loss-on-ignition. If the quantity of additives being used is known, this percentage could be subtracted from the per cent loss-on-ignition and a more accurate per cent resin content figure would be obtained. In addition, the chemically combined water and organic material present in the base sand would be a part of the loss-on-ignition. A loss-on-ignition test could be made on the base sand and this percentage could be subtracted from the resin-sand mixture loss-on-ignition, giving an even more accurate resin content test.

Procedure

1. Dry a small sample of the resin-sand mixture at $220\text{-}230\text{ F}$ to constant weight. Care should be taken in sampling powdered resin-sand blends as segregation may occur.

2. Transfer sample to a small agate mortar and break lumps. In breaking the lumps, resin could be knocked from the sand and segregation could result in sampling.

3. Accurately weigh at least 5 gm of this dried sand mixture and transfer to a suitable size crucible provided with a cover. (Dish and cover should be pre-ignited to constant weight and cooled in a desiccator.) As in any test procedure, a larger sample provides better

Let's Get Personal

continued from page 67

Laboratory to the development and research division at the New York office.

David Duff . . has been appointed manager of product engineering for the Everett-Lynn foundries of General Electric Co.'s Foundry Department.

A. Rottinghouse . . has been named production manager of the Delhi



A. Rottinghouse

Foundry Sand Co., Cincinnati. He was formerly plant superintendent.

H. G. Monroe . . has joined the Baroid Div., National Lead Co. as a sales engineer. He will represent the concern in the central area.

J. C. Laegeler . . has been named chief engineer for the Frank G. Hough Co., Libertyville, Ill. He was formerly manager of the product improvement department.

Malleable Founders' Society has filled two newly created staff positions. **A. H. Forbes II** has joined the staff as a shop practice engineer and **D. B. Sanberg** has assumed general administrative duties under the executive vice-president.

W. J. McGraw . . has been appointed manager of the Thor Power Tool Co. electric tool sales division.

R. A. Petersen . . has been appointed manager of the new Birmingham, Ala., office of Pangborn Corp. The new district office is located at 1731-C Valley Ave., Birmingham.

Dr. F. J. Shortsleeve . . has been appointed assistant director of research of the Metals Research Laboratories of Electro Metallurgical Co. Div. of Union Carbide Corp.

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The chill blocks at the right clearly show how the chilling properties of gray iron are sharply reduced by small ladle additions of SMZ alloy, a strong graphitizing inoculant containing silicon, manganese, and zirconium. The blocks were poured from a 3.15 per cent carbon, 1.80 per cent silicon iron. Additions of 5, 8, and 16 pounds of SMZ alloy per ton (0.15, 0.25, and 0.50 per cent silicon) progressively reduced the chill depth from 1.09 in. for the untreated iron to 0.19 in. for the iron which received the heaviest addition.

The exceptional ability of SMZ alloy to eliminate chill in corners and thin sections vastly improves the machinability of iron. Foundries have reported that inoculating iron with SMZ alloy increases the machining rate by as much as 25 per cent. As little as 2 to 4 pounds of the inoculant are sufficient to eliminate hard corners and edges in light castings. For harder irons of low carbon and silicon contents a larger addition of the alloy may be required.

Write or phone your nearest ELECTROMET office for more information on this important ladle-addition alloy. Ask for the booklet, SMZ Alloy—An Inoculant for Cast Iron. An ELECTROMET representative will also be glad to give you all the technical details.

Offices: Birmingham, Chicago, Cleveland, Detroit, Houston, Los Angeles, Phillipsburg, N.J., and San Francisco. In Canada: Electro Metallurgical Company, Division of Union Carbide Canada Limited, Toronto.



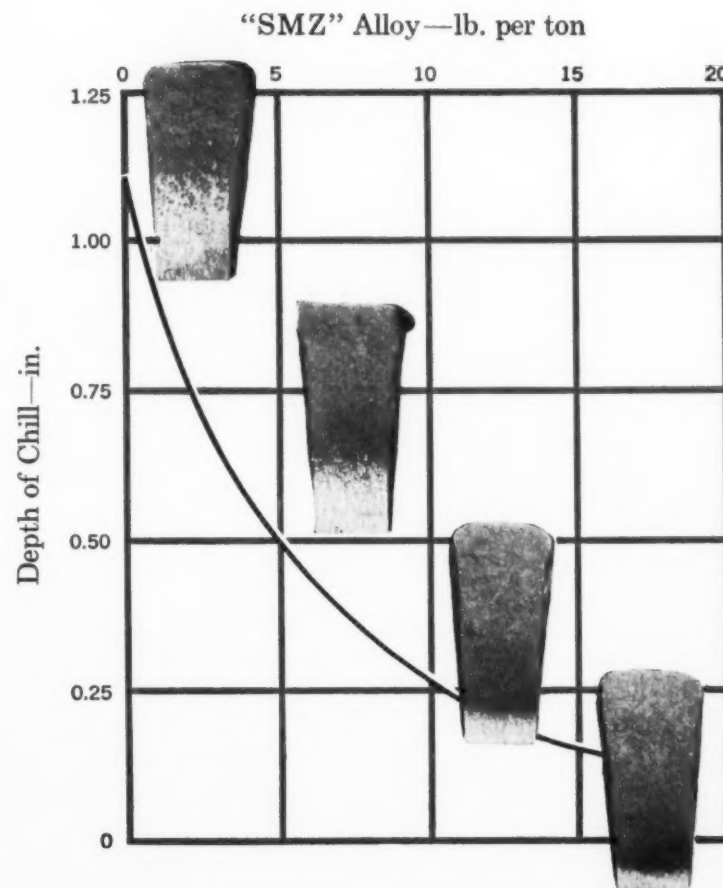
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Federal Foundry Supply Co. purchased by Archer-Daniels-Midland.

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service behind the ingot

Circle No. 168, Page 7-8

foundry trade news

Archer-Daniels-Midland Co. . . Minneapolis, has purchased Federal Foundry Supply Co., Cleveland. The acquisition provides ADM with a complete line of basic foundry materials and supplies. The Cleveland company becomes a subsidiary and will be integrated with ADM's Foundry Products Division which has headquarters in Cleveland. The Cleveland company produces seacoal, core washes, foundry facings, parting compounds, core and mold blowing machines, bentonite, vermiculite and sells a full line of foundry supplies and equipment, all of which are new to ADM.

Vanadium Corp. of America . . sales for the first six months of 1957 were \$29,207,486, earnings were \$2,480,762, or \$1.97 per share, the second highest in the company's history. The similar period in 1956 sales were \$33,178,852, earnings of \$3,258,265, or \$2.58 per share. The 1956 sales and earnings represent all-time highs.

Magnet Cove Barium Corp. . . Houston, Texas, in October will start on 33,500 sq ft expansion to its present building. Another 4000 sq ft will be added to an adjacent garage building.



Magnet Cove Barium plant to which additions will be made.

Crescent Brass Mfg. Co. . . Reading, Pa., brass founders, is now under new ownership. F. S. Stump, formerly secretary-treasurer, Willson Products, Inc., also of Reading, is president. The name has been changed to Crescent Brass Mfg. Corp.

Perseverance Iron Foundry . . Philadelphia, which started operations in 1857 continues to operate at its original location. Due to the early problems, Perseverance was incorporated into the original partnership name. The foundry does a general jobbing business specializing in small lots using no molding machines. The equipment includes a cupola built in 1885.



Perseverance officers James Lanning and Percy Lanning.

The Lanning family has been associated with the business for more than 80 years, purchasing it in 1899.

Archer-Daniels-Midland Co. . . Detroit Foundry Products Division is now located at 2507 24th St., Detroit 16.

Knight Engineering Establishment . . Vaduz, Liechtenstein, consulting engineer, has opened a branch at Bahn Hof Strasse 17, Zurich, Switzerland.

Gaines Co. . . Rivera, Calif., is devoting 2500 of its 30,000 sq ft of foundry space to shell molding. Gaines also does permanent mold, semi-permanent mold, green sand, dry sand, and centrifugal casting.

Alberta Phoenix Tube & Pipe Ltd. . . Edmonton, Canada, has announced plans to manufacture 16-in. line pipe and casing in diameters of 10%, 8%, 7, and 4 1/4 in. O.D. Modification of the present mill line and

expansion will cost approximately half a million dollars. The plant has been in production for 10 months, manufacturing line pipe from 3½ to 12¼ in. O.D.

Foundry Equipment Manufacturers Association . . Washington, D. C., has elected two new members, Torit Mfg. Co., St. Paul, Minn., and Nomad Foundry Equipment Div., Westover Corp., Milwaukee.

Electric Steel Foundry . . Portland, Ore., employees have presented to the management a plaque as an expression of appreciation of company efforts to offer continuous employment and seeking better labor relations.

Materials Research Corp. . . newly formed organization to advise industry and government on metallurgical and general materials problems, has research and development laboratories in Yonkers, N. Y.

American Iron and Steel Institute . . for the ninth consecutive year is underwriting a special high-purity iron program at Battelle Memorial Institute, Columbus, Ohio. Efforts will be continued to obtain purer iron by developing better processing methods. These will generally involve the zone-melting technique.

Foundry Services, Inc. . . Columbus, Ohio, announces that J. H. Whitney & Co., New York, has acquired a substantial minority interest in the company. The Ohio firm is an affiliate of Foundry Services (Overseas) Ltd. of Birmingham, England, a part of the Minerals Separation Group.

The United States leads the world in the number of foundries using shell molding on a production basis and consumes more phenolic resins, according to figures compiled by Shallway International Corp., Palo Alto, Calif., and Crawley, England, exporters of foundry equipment.

The United States has 520 foundries consuming 700 tons of phenolic resins monthly, Japan has 325 foundries consuming 250 tons monthly, England's 350 foundries use 230 tons, France has 65 foundries accounting for 80 tons and Germany's 60 foundries also use 80 tons monthly.

National Malleable & Steel Castings Co. . . Cleveland, reports earnings for the first half of 1957 of \$1,871,090, or \$3.33 a share compared with

Continued on page 78

FOUNDRY CORE PRACTICE



Second Edition covers ingredients, mixing methods and preparation of cores as well as setting and holding them in molds!

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Mixing Equipment, Operations,	Core Setting
Distribution and Storage	Core Knock-Out
Core Making Methods and Equipment	Core Sand Reclamation
Factors Affecting Core Baking	Casting Surfaces as Affected by
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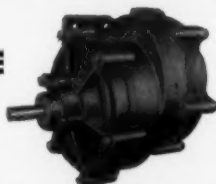
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WESTFIELD, N. Y.

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Foundry Trade News

Continued from page 77

earnings of \$2,014,772 or \$3.59 a share in the first half of 1956 based on the number of shares outstanding. Net sales of \$35,350,382 were slightly above the 1956 first half sales of \$34,108,569.

Whiting Corp. . . Harvey, Ill. showed earnings of \$2.30 per share common stock on 350,720 shares outstanding at the end of the fiscal year. This compares to \$1.43 per share on 303,070 shares outstanding a year earlier. The increase in common shares was due to conversion of nearly all of the outstanding preferred shares.

American Brake Shoe Co. . . has reported net earnings of \$5,426,912 equal to \$3.64 per common share, for the first half of 1957 compared with \$4,825,770, or \$3.09 per common share in 1956, based on the number of shares outstanding at the close of the 1957 period. Revenues totaled \$99,467,228 for the first six months compared with \$96,154,828 a year ago.

American Steel Foundries . . Chicago, had a net income of \$6,133,273 or \$4.67 per share on sales of \$92,191,279 in the nine months ended June 30, 1957. This compares with a net income of \$6,709,522, equal to \$5.24 per share after giving effect to the five per cent stock dividend paid in October, 1956, on sales of \$89,926,007 in the same period a year ago.

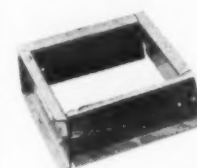
Climax Molybdenum . . and its consolidated subsidiaries during the first six months of 1957 showed a net profit \$8,480,000 after all charges including accruals for federal income taxes. This was equivalent to \$3.29 per share of common stock. During the first half of 1956 net earnings were \$7,586,115 or \$2.94 per share of common stock.

Blaw-Knox Co. . . Pittsburgh, Pa., has awarded four scholarships providing four years' study in engineering or physical science. Each award provides \$1000 yearly for the student and a \$500 grant-in-aid to the university involved. Selection of the awards, for which the children of any non-officer employees of the company may compete, were made by an independent scholarship committee. Two winners live in the Pittsburgh area, and two in Indiana.

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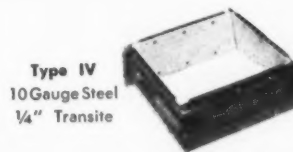
Type I
3/16" Steel



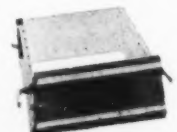
Type II
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Type III
1/4" Steel



Type IV
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Circle No. 172, Page 7-8

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For Sale, Help Wanted, Personals, Engineering Service, etc., set solid . . 25c per word, 30 words (\$7.50) minimum, prepaid.

Positions Wanted . . 10c per word, 30 words (\$3.00) minimum, prepaid. Box number, care of **Modern Castings**, counts as 10 additional words.

Display Classified . . Based on per-column width, per inch . . 1-time, \$18.00; 6-time, \$16.50 per insertion; 12-time, \$15.00 per insertion; prepaid.

Help Wanted

LARGE GRAY IRON FOUNDRY in Chicago area needs a Castings Engineer, Pattern Layout man or equivalent in experience, to mark blueprints for pattern construction and estimating. Some experience with large iron castings and weight estimating a requisite to permanent position in Estimating Department. Salary commensurate with ability. State age, education, experience and salary required. Replies handled confidentially. Box D-69, **MODERN CASTINGS**, Golf and Wolf Roads, Des Plaines, Ill.

FOUNDRY MECHANIZATION LAYOUT ENGINEER Well-known manufacturer of foundry equipment needs a young foundry engineer. Position offers a real challenge and excellent future. Drafting, industrial layout, or foundry experience desirable. A short resume requested in advance of interview. Reply Box No. D-72, **MODERN CASTINGS**, Golf and Wolf Roads, Des Plaines, Ill.

Wanted to Buy

Wanted to Buy 1945 issues of Foundry magazine, January-December. Will pay \$1.00 each for uncut copies in good condition. Box No. 70, **MODERN CASTINGS**, Golf and Wolf Roads, Des Plaines, Ill.

TRANSACTIONS AFS back volumes and sets—wanted to buy for cash, also other scientific and technical journals. A.S.F. ASHLEY, 27 E. 21st Street, New York 10, N.Y.

For Sale

NON-FERROUS FOUNDRY West of Milwaukee, Wis. Fireproof building, large parking area, room for expansion, making castings for many well-known firms, opportunity unlimited, well established. Box No. D-71 **MODERN CASTINGS**, Golf and Wolf Roads, Des Plaines, Ill.

MOLDING MACHINE: Herman 6000# capacity, jolt-roll-draw in operating condition, asking \$2,900.00 FOB Pottstown Machine Co., Pottstown, Pa. (Phone 37, H. H. Houston)

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Circle No. 173, Page 7-8

casting through the ages

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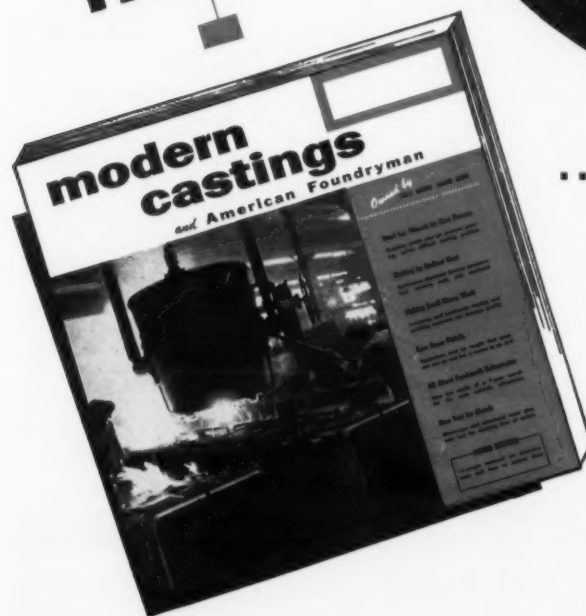
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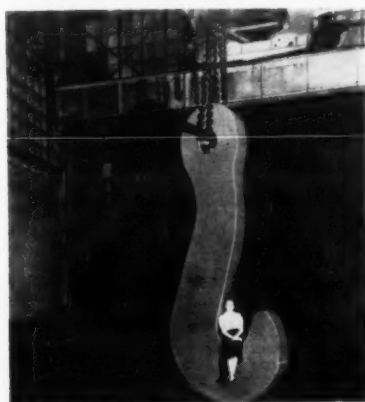
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Crane Hook



Hook, one of two used on 500 ton crane, is over 17 ft long, 7 ft wide, and 12 in. thick. Each hook weighs 34,000 lb. Total weight of the crane including electrical equipment, excluding ladle, is 1,841,000 lb. The crane, made by Morgan Engineering Co., Alliance, Ohio, handles a ladle with a 17-ft top diameter, 14-ft bottom and 17-ft height.



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CLEVELAND

LOS ANGELES

modern castings

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